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EDITORIAL

THE advent of a new editor may involve sweeping changes both of style and editorial policy. However, with an established publication such as the *British Journal of Educational Psychology*, few changes would be acceptable to the readership, and indeed, the successful record of the *Journal* shows that major alterations are unnecessary.

One small change in style is introduced in this issue. The leading page of each article contains an ' identifier.' Also the typeface has been altered slightly to give a bolder print. Both these changes are designed to assist research workers who require their legitimate *single* photocopy of articles.

Professor Nisbet's article in the November issue drew attention to certain categories of article which were unlikely to be accepted. Would-be contributors might find his experience useful in deciding whether their own research is suitable for a journal with an international readership. A new editor may imply a different selection of articles being made, but any sudden change in policy is unlikely. The editor relies on the judgment of referees and so his own views are only decisive where doubt remains. Nevertheless, any journal must be responsive to changing climates in research and the articles already received this year do reflect a different balance of activity. There is still a substantial number of articles reporting experimental studies, or surveys leading to multivariate analyses of test scores, but there is an increasing proportion of articles which owe more to the ' social-anthropological' paradigm than to the ' agricultural ' research designs of Fisher. Studies of classrooms using observation schedules clearly draw on psychological categories in describing behaviour. But observations lead to other insights which depend more on sociology for their theoretical background. The *British Journal of Educational Psychology* can hardly be expected to define its boundaries so sharply that interesting ideas from other disciplines are prohibited. As a result papers have already been accepted which are critical of conventional approaches to educational psychology. It is to be hoped that these articles will be sufficiently provocative to encourage other contributors to join the debate, either in agreement or with contradictory views and evidence. The *Journal* must remain primarily concerned with empirical research studies, but influential articles which discuss methodology or underlying theory clearly have their place, as also have ' position papers ' from experienced research workers.

Another area has shown a recent shift in methodology—the study of human learning. A bolder approach has allowed more complex learning to be tackled and a number of articles will present the results of studies in which *meaning* of the stimulus materials has acknowledged importance. The new procedures adopted perhaps lack the tight experimental control of earlier work, but the combination of quantitative and qualitative evaluations of human learning may provide insights which may become of fundamental importance to the readers of this *Journal*. These research reports do, however, create problems both for editor and readers. Where the learning experiment uses complex material, problems of reporting the findings become immense. It is still not clear how best to present research work of this kind, but its potential significance suggests that, difficult or not, the results should be made available to a wider audience.

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The general shift in methodology in educational research, as in psychology, is away from explanations which appear redolent of mechanistic causality and towards what some may see as 'irrational sentimentality.' Perhaps the pendulum should shift, because one research paradigm in educational psychology has become dominant. But "the solution is certainly not to abandon psychometrics in search of intuitive certainty from observation. In this way we simply exchange uncertain interactions (between measures and social settings) for unverifiable introspections . . . Jaffé quotes Jung as saying : 'We shall probably have to resort to a mixed explanation, for nature does not give a fig for the sanitary neatness of our intellectual categories of thought.'" (Entwistle, 1974.)

ENTWISTLE, N. J. (1974). Complementary paradigms for research and development work in higher education. In VERRECK, W. A. *Methodology Problems in Research and Development in Higher Education*, Amsterdam : Swets and Zeitlinger B. V.

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SKILLS OF ANALYSIS AND SYNTHESIS IN THE EARLY STAGES OF READING

By TESSA ROBERTS

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SUMMARY. An examination was made of the 'actions' of early reading—analysis and synthesis—within the modalities of sound alone and sound with sight. The relative difficulty of these skills for a sample of forty 5 and 6-year-old children was established through an assessment of their performance of four different tasks of analysis or synthesis involving four word lists of equal difficulty. Purely auditory synthesis was found to be considerably easier than any other skill ; analysis involving both sound and sight was found to be by far the most difficult.

INTRODUCTION

THIS research represents an attempt to look closely at the actions which children are expected to perform in the early stages of reading and writing when taught by systematic methods, containing a phonic ingredient.

More concern has generally been shown in the literature for the elements of reading than for the actions which must be carried out upon them. Much consideration is given to method and order in teaching letter-shapes, single sounds, etc. ; little to processes such as analysis and synthesis. There are very few studies of either blending or analytic ability in reading.

Chall, Roswell and Blumenthal (1963) and Le-Roy-Boussion (1963) both found the ability to synthesise sounds closely associated with reading ability, and in the French study a close connection with appropriate teaching was also found. Elkonin (1971) refers to evidence from the work of several Soviet psychologists that young children have little natural ability to analyse a word into separate sounds even though they may have learned to read. With proper teaching, however, they can learn to do this quite competently between the ages of 4 and 6.

In short, both processes appear to be affected by appropriate teaching, and synthesis is apparently more closely related to reading ability than analysis. (Analysis, it will be suggested, is more relevant to writing). How the two processes relate to each other, however, remains largely unexplored.

Moreover, there is little general agreement about what such terms as analysis and synthesis mean in the reading situation, as the modality is seldom defined. In using the term analysis, for example, Schonell (1945) generally appears to refer to purely visual analysis while Roberts (1970) refers to purely auditory analysis. Before conducting any investigation into the 'actions' of reading, therefore, it was necessary to define the terms to be used. It was decided that the two processes of analysis and synthesis would be considered in the modalities of sound alone and sound combined with sight. These were chosen as being most closely connected with early reading difficulties, sight alone being excluded, as the purely visual analysis of words into separate letters seldom seems to present much difficulty even to the youngest of school attenders while purely visual synthesis has little meaning in terms of reading behaviour.

Four categories of reading 'actions' were, therefore, under consideration :

(1) Synthesis (sound)

(2) Analysis (sound)
(3) Synthesis (sound and sight)
(4) Analysis (sound and sight)

In practical terms, these categories refer to the following skills.

Sound Alone (no written material necessary).

(1) *Synthesis* : Given sounds /k/-/æ/-/t/, blending them to provide /kaet/ (sound).

(2) *Analysis* : Given sound /kæt/, analysing it to provide /k/-/æ/-/t/ (sound).

Sound and Sight.

(3) *Synthesis* : Given the sight CAT, blending the separate sounds evoked by the letters to provide /kæt/ (sound).

(4) *Analysis* : Given the sound /kaet/, analysing it to provide separate sounds /k/-/æ/-/t/ and writing down appropriate letters (sight).

Synthesis/Analysis. It was anticipated that, within a specific modality, synthesis would prove an easier process than analysis. Analysis begins with a meaningful stimulus whereas synthesis leads to a meaningful response and while McGeoch (1930) showed that any degree of meaningfulness is an aid to learning, Cieutat *et al.* (1958) have shown that meaningfulness of response is even more effective than meaningfulness of stimulus. Doubtless, the question of cognitive feedback is also involved here. Gibson (1953), reviewing evidence concerning the effectiveness of training on perceptual learning, found that knowledge of results was an important factor in promoting learning. The synthetic response in the form of a whole word provides a degree of cognitive feedback in that the answer ' makes sense ' whereas the analytic response in the form of a string of letters provides no such support.

Sound/Sound and Sight. Within each of the two processes it was anticipated that the purely auditory approach would offer less difficulty than the auditory/visual approach. Murdock (1967), comparing paired-associate and serial-list learning in visual, auditory, and mixed modalities, found that purely auditory stimulus and response produced better results than purely visual or mixed modalities.

When the learning in question involves language, the role of experience is especially significant. In the early stages of reading, the child has already a lifetime's experience of sound, but very little experience of written representation. It is, therefore, to be expected that he will learn more easily through the medium of sound alone and that the introduction of written material will be a complicating rather than a facilitating factor.

Thus practical experience and experimental evidence both suggested the ollowing picture (+denoting ease and —difficulty of mastery) :

Synthesis+	Sound+
Analysis—	Sound and sight—

Further, a combining of the two dimensions produced a sharper picture at each end.

+ Synthesis	+ (sound)	+ Synthesis	– (sound and sight)
– Analysis	+ (sound)	– (Analysis)	– (sound and sight)

This suggested even more strongly that Synthesis (sound alone) would prove the easiest task of all while Analysis (sound and sight) would prove the most difficult.

METHOD

An experiment was designed to assess the ability of young children to carry out the actions of analysis and synthesis in the two chosen modalities.

Tasks.

Subjects were to be asked to perform four tasks corresponding to the four classifications proposed.

	Sound	Sound and sight
Synthesis	1.	3.
Analysis	2.	4.

(1) Tester says /ɔ/-/n/ Child says /ɔn/

(2) Tester says /it/ Child says /i/-/t/

(3) Tester shows card with word written on it. Child sounds letters and synthesises words from his own sounds : UP – – – – /ʌ/-/p/– – – – /ʌp/.

(4) Tester says /æt/. Child analyses /æ/-/t/ and writes down appropriate letters from memory store : AT.

Material.

Published blending tests could not satisfactorily serve as material for these tasks as their aim is to examine one process in depth and they therefore consist of words which become progressively more complex. Here the interest is in a comparison of several skills at a single level. The need is for words which represent a very narrow range of complexity, but involve a wide range of letters. Five lists were compiled as there was, at this stage, some interest in trying out a fifth task, a form of sound +sight analysis which involved recognition rather than recall of letter shapes. Five lists of simple, chiefly three-letter, words were drawn up, each list consisting of 10 words (e.g., ON, JET, RUG, VAN, CUP, YES, HIM, WILL, LOOK, FAST). It was hoped that all lists would offer an equal degree of difficulty when used as material for any one of the tasks. They were tried out informally with several children, and minor adjustments made.

A pilot study was then carried out to assess whether the five word lists compiled did, in fact, offer a similar degree of difficulty when presented as material for each task in turn. Subjects were 25 children drawn from the infant departments of three different schools. Each child was given only one task to perform, but he followed it through all five lists. The order of presentation of the lists was determined according to a Latin Square design. Five children were allocated to each process. Thus, each list was tried 25 times in all, five times with each process. Summation of process means for each list yielded the following results.

TABLE 1

SUMS OF PROCESS MEANS FOR EACH LIST.

List	1	2	3	4	5
Mean	40·2	40·0	39·2	39·6	40·0

Since the differences between means are so slight, it was assumed that each list represented a comparable level of difficulty when used as material for the analysing and synthesising processes.

Sample.

The tasks and material having been established, the main study then took place in two successive years. A single school was used in order to achieve uniformity of experience. The children came from homes where there is little concern with the printed word, and little educational aspiration. In the spring of 1973 and 1974, all 5- and 6-year-old children were first tested for their ability to recognise letters and give their related sounds, as a stable letter/sound knowledge was considered a prerequisite for inclusion in the study. Those considered to be reading too fluently for the study to be relevant to their level of achievement were excluded. From the remainder, on each occasion, 10 boys and 10 girls were randomly selected and tested individually. Thus, in all, 40 children were tested.

Procedures.

A Latin Square design was again used to allocate lists to processes and to determine the order of presentation of tasks. Testing for each child was generally carried out in two sessions but adaptations were sometimes necessary with the very young.

With each new process examples were given and trials made until the child gave two correct responses. It was then assumed that he had an adequate understanding of the task and work on the list began. If the child could not provide two correct responses, that particular task was abandoned and a score of 0 recorded.

During testing, each word or letter group was spoken twice. There was no formal time limit for the third and fourth tasks : the tester passed on when she judged, from a knowledge of the child, that he was unlikely to respond, given further time. In the third task, the tester gave no assistance in supplying sounds : the child was required to blend the sounds which he himself spoke.

RESULTS

The 160 scores from the four tasks were submitted to an analysis of variance. The difference between sexes (mean scores : boys = 6·85, girls = 8·06) was found to be statistically significant (P< ·05). The difference between tasks was also large enough to be considered real rather than chance, and t tests were made in order to evaluate the differences between particular tasks and groups of tasks.

TABLE 2

ANALYSIS OF VARIANCE.

Source of variation	Sum of squares	Degrees of freedom	Mean square	
A—tasks . . .	447·3	3	149·1	P< ·01
B—sex	58·8	1	58·8	P< ·05
AB	21·2	3	7·1	NS
P (pupils). B	443·1	38	11·7	
AP.B	343·2	114	3·0	
Total	1313·6	159		

TABLE 3

MEANS FOR EACH TASK.

Task		Mean
1	Synthesis (sound)	9·40
2	Analysis (sound)	8·15
3	Synthesis (sound and sight)	7·45
4	Analysis (sound and sight)	4·83

TABLE 4

COMPARISON OF TASK MEANS.

Comparison	Tasks	t	p
1	1+2 *v* 3+4	9·62	< ·01
2	1 *v* 2+3+4	8·19	< ·01
3	1+3 *v* 2+4	7·07	< ·01
4	1+2+3 *v* 4	11·08	< ·01

The results offer strong support for the hypotheses :

(1) that within either process, an approach through sound alone is easier than one involving both sound and sight (Comparison 1) ;

(2) that purely auditory synthesis is easier than all other tasks (Comparison 2) ;

(3) that within either modality, synthesis is easier than analysis (Comparison 3) ;

(4) that analysis involving both sound and sight is more difficult than all other tasks (Comparison 4).

DISCUSSION

These findings have certain implications for the teacher who is planning a reading, and ultimately, a writing programme. Clearly, in developing the particular skills of analysis and synthesis, an initial approach through sound alone may be most effective. Most commonly, where 'ear-training' does occur in schools, it is confined to the discrimination of different sounds, but a child must learn to do something with the sounds he can discern—to synthesise and analyse them. It is doubtful whether children are given sufficient opportunity to 'manipulate' sounds in this way.

Purely auditory synthesis is likely to present least difficulty and therefore provides an excellent starting point for an analysis/synthesis programme. It presented little difficulty to most children in the sample and appeared to be a source of fun to many. A small-scale additional study was conducted with those children without sufficient letter/sound knowledge to take part in the main study. Almost all of them had more skill in blending letters to form words than they had in giving sounds for displayed letters. In fact, the mean for the blending task was almost twice that for the letter-knowledge task. Yet these children, like most, would have received far more teaching geared to learning letters than to blending sounds. A strong argument emerges for capitalising on this apparent facility which young children have for blending sounds. Prior mastery of synthesis by ear would avoid much of the difficulty children often experience when, as they reach the stage of sounding letters from the printed page and blending them to form a word, they are expected to acquire the blending skill in the context of the task involving written material.

Within either of the modalities considered, synthesis was found to be decidedly easier than analysis and therefore deserving of an earlier place in the reading programme. Teachers are, in fact, most likely to provide experience related to synthesis first, but it is doubtful whether they always increase such provision to encompass analysis at a later stage. Yet mastery of analysis is essential to a thorough understanding of the system of sounds and symbols operating in written language and too important to be left to an intuitive transfer of knowledge from the synthetic situation.

Analysis involving both sound and sight was by far the most difficult task reviewed here. While it represents an advanced-level skill in a reading programme, it must be considered a fundamental skill for a writing programme. It is necessary to the child about to embark on independent writing. It is as unrealistic to expect him to write entirely by drawing from a bank of visually remembered words as it is to expect him to read entirely from a sight vocabulary. He must have at his disposal a strategy for dealing with writing problems which will involve some form of sound analysis together with the ability to link sounds to recalled letter shapes. The particular difficulty of this mixed-modality analysis is doubtless reflected in the reluctance, or inaccuracy, of many young writers. It suggests a need for particular teaching attention to what is often a completely neglected area : activities geared to analysis (not just synthesis) and to recall of letter shapes from an auditory cue (not just recall of sounds from a visual cue). It is doubtful whether most children can effectively carry out for themselves the kind of reversed transfer from reading which may be expected of them.

Finally, the results suggest that boys are more in need of help than girls. Their poor performance suggests that they have a special difficulty in acquiring skills of analysis and synthesis, a factor which may contribute to the lower standard of reading which they are commonly found to achieve (e.g., Rutter *et al.*, 1970).

In summary, while results are qualified by the fact that the research was on a small scale, two main points emerge :

(1) that the hierarchy of skills in question appears to rest on purely auditory synthesis, and that this is where training might most usefully begin ; and

(2) that analysis involving both sound and written material is particularly difficult and warrants more teaching attention than it normally receives.

How far these skills are susceptible to teaching has not been assessed, but evidence from the literature (e.g., Le-Roy-Boussion, Elkonin) suggests they *are* teachable.

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THE EDUCATIONAL PRIORITY SCHOOL

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SUMMARY. The study was designed to establish, on a regional basis, the validity of a set of measures of social handicap as predictive of educational backwardness and to identify the characteristics of those schools which are most effectively compensatory in adverse social conditions. Backwardness was defined in relation to scores on standardised intellectual tests for 7-year-old and 10-year-old children attending 115 Northern Ireland primary schools. The proportion of backwardness was then predicted from thirteen demographic variables, commonly used in describing educational priority areas, by the application of step-wise multiple regression analysis.

Parental unemployment and the occupational status of the school neighbourhood emerged as the strongest pointers to educational backwardness. The social variables predicted backwardness least accurately in smaller, less well equipped and rural schools. The schools which were most effectively compensatory tended to be urban, to have less physically adequate classrooms, female principals, and a higher proportion of graduate-trained teachers.

INTRODUCTION

As a basis for a policy of ' positive discrimination ' in favour of pupils and schools in educational priority areas, the Plowden Report (1967) stressed that e.p.a's should be designated on the basis of objective, easily available criteria which would identify those places where educational handicaps are reinforced by social handicaps. The report called for further research to establish the regional validity of its eight suggested indices.

The Plowden definition of e.p.a. has been criticised by Halsey (1972) as being area rather than school based. Ferguson *et al.* (1971) have pointed out that the effect of applying the Plowden indices is to classify a school in terms of the socio-economic characteristics of its area. Little and Mabey (1971), whose ILEA index was begun in 1967 as an attempt to measure and weight those of the eight Plowden criteria which were found to be both satisfactory and measurable, have queried the generality of Plowden-type indices across the variety of local conditions that exist within the United Kingdom. For example, ' unemployment,' excluded from the Plowden indices, was included as a social criterion in the Birmingham e.p.a. action-research (Halsey, 1972), whereas Caves (1973) has pointed out that ' immigrant children ' is irrelevant to an e.p.a. policy in Belfast.

A more serious criticism has been advanced by Ferguson *et al.* (1971). They found, for a sample of 12 schools chosen by l.e.a. designation as representative of advantaged, settled working-class and disadvantaged neighbourhoods, that the distribution of developmental characteristics among pupils was not sufficiently related to the Plowden criteria of socio-economic status to justify the identification of need for extra help. They concluded that a more child-centred approach than that suggested by Plowden is needed.

Ferguson and Williams (1969) have shown that despite the vast amount of published American work on compensatory education research there is little reference in the literature to the methods used to identify the need for compensatory education. When they collected information on 69 American compensatory projects they found that 27 were based on an identification of areas, 10 on an identification of schools, two on an identification of families, and 30 on an identification of individual pupils. They add that the child-centred approach to identification may be more marked than the data suggest, since projects qualified for government funds on the strength of there being made available statistics of community or area need.

Plowden recognised that census-type indices of social and economic disadvantage may be less discriminative of educational priority than measures of parental attitude, home literacy or parental aspiration. The former are simply more easily available. The Plowden dilemma is noted by Little and Mabey (1971) when they observe of the ILEA index that though it may help to rationalise the allocation of resources it does not permit any measurement of the impact of such resources, which Plowden saw as compensatory within the schools rather than as operating directly on the socio-economic causes of deprivation. More pertinently still, it offers little guidance towards specifying what these resources should be.

Glennerster (1969), for example, has pointed out that before resources can be effectively concentrated information is needed in answer to some or all of the following questions :

(1) In what ways do the schools in the proposed areas differ from the ' average ' school ? What are their peculiar deficiencies ?

(2) What resources make the greatest contribution to improving the children's attainment—the number or quality of teaching staff, equipment ?

(3) How important is school organisation and teaching method compared to the allocation of resources in this kind of school ?

(4) Have any schools in such areas proved particularly successful ?

THE STUDY

The present study was designed to establish, on a regional basis, the validity of a set of Plowden-type measures of social handicap as predictive of educational backwardness ; to identify those schools for which the social variables are least accurately predictive of backwardness, and to examine the organisational characteristics and resources of those schools which are most effectively compensatory in the face of social conditions beyond their immediate control.

The study is based on 115 schools, 112 of which had a 7-year-old enrolment and 110 of which had a 10-year-old enrolment. The schools formed a one-in-ten stratified probability sample of all Northern Ireland primary schools. The data used in the study were available from an investigation carried out by the Research Unit of the Northern Ireland Council for Educational Research and reported by Wilson (1971).

The external school measures were chosen as indicative *per se* of social and economic disadvantage, as being regionally relevant to Northern Ireland, as consisting of easily available census-type or school-based data, and as identical with or closely comparable to those measures most frequently suggested in the literature (Plowden, 1967 ; Little and Mabey, 1971 ; Halsey, 1972).

Eight of the 13 measures were deficit indices based on each of the two school enrolment age-groups, 7-year-olds and 10-year-olds. Five were in the form of between-school continua, of which three were based on total school enrolment and two were in the form of ' impression ' ratings of the school neighbourhood. The basis of each of the 13 measures is shown below :

Age-Group Measures (7 and 10-year-olds).

1. Occupation : Percentage of fathers in Registrar-General's classes IV and V.
2. Overcrowding : Percentage of homes with 1·5 or more persons per room.
3. Large families : Percentage of homes with 4 or more children under school leaving age.
4. Housing stress : Percentage of homes with no inside water supply.
5. Family stress : Percentage of homes with one or both parents missing.
6. Unemployment : Percentage of fathers unemployed over a two-year period.
7. Lack of hygiene : Percentage of pupils verminous at school inspection.
8. Attendance : Percentage of pupils with below average (i.e., 92 per cent) attendance.

School Enrolment Measures.

9. Attendance : Percentage attendance for school.
10. Free meals : Percentage of children receiving free meals in the school.
11. Unemployment : Estimated percentage of unemployed fathers.

Neighbourhood Measures.

12. Occupational status : Five-point scale.
13. Type of housing : Five-point scale.

In the sample schools test scores for picture intelligence, reading and mathematics were available for all 7-year-olds, and test scores for verbal and non-verbal intelligence, reading and mathematics were available for all 10-year-olds. Any pupil whose standardised test score was more than one standard deviation below the test mean was classified as backward. This basis made available three by-school percentages of backwardness for 7-year-olds, and four by-school percentages of backwardness for 10-year-olds.

In addition, the percentages of backwardness for reading and mathematics were averaged by schools for each age group to give composite percentages of attainment backwardness. The percentages of backwardness for non-verbal and verbal intelligence were averaged by schools for 10-year-olds to give composite percentages of backwardness in ability. The three test based percentages, averaged by schools for 7-year-olds, and the four test based percentages, averaged by schools for 10-year-olds, gave composite percentages for general backwardness. Thus, five backwardness percentages were available for each 7-year-old school, and seven were available for each 10-year-old school.

A further 30 measures were available for each of the 115 schools. These were based on the school's location, whether rural, urban or city, and organisational characteristics, on independent check-listings of its physical amenities and resources, on independent assessments of its teaching methods in reading and mathematics, and on the training, qualifications and experience of its teachers.

SOCIAL PREDICTION

To determine their predictive efficiency the social variables were entered in step-wise regression against each, in turn, of the backwardness criteria for each age-group. Each step-wise regression in this and subsequent analyses was terminated when further addition to assigned variation failed to reach an F-level of 2·0.

The regression solutions are summarised in Table 1. Each table presents the zero-order correlations (r) between predictors and criteria, the terminal *beta* weights for those variables which entered into regression, and the probability of F for significant terminal additions to assigned variation.

In the schools for 7-year-olds the major predictor is age-group *occupation*, followed by school *unemployment* and neighbourhood *occupational status*. *Overcrowding* and *free meals* appear for intelligence and *family stress* appears for mathematics. Neighbourhood *housing* acts as a suppressor variable.

In the schools for 10-year-olds school *unemployment* is the strongest predictor, followed by *lack of hygiene*. Neighbourhood *occupational status* is important for mathematics and *free meals* appears for non-verbal intelligence. *Housing stress* appears for reading, but in the contrary direction to expectation.

The two predictors which stand up most strongly over criteria and age levels are school *unemployment* and neighbourhood *occupational status*. The strongest predictor at age 7, age-group *occupation*, declines in importance with age. Contributions to prediction from *overcrowding*, *large families*, age-group *unemployment* and school *attendance* are slight. Age-group *attendance* becomes more important with age, but *free meals* remains a weaker predictor than might have been anticipated.

As terminated, regression explains between a quarter and a third of between-schools variation in backwardness in the schools for 7-year-olds. Most variation is explained for the attainment composite and least for intelligence and mathematics. In the 10-year-old schools less than a quarter of between-schools variation is explained for all criteria but one, non-verbal ability. The overall level of predictive efficiency is low, with two-thirds or more of between-schools variation unaccounted for.

ACCURACY OF PREDICTION

The sample of schools encompassed a wide range of characteristics. School enrolments, for example, ranged from 10 to 875 pupils, with a preponderance of smaller, mostly rural, schools. It was suspected that these schools might be contributing to the predictive inefficiency of the social variables, given that estimates based on very small within-school age-groups are likely to prove unstable because of sampling fluctuations.

To distinguish schools with regard to the degree of accuracy with which educational backwardness is predicted by social handicap regression equations were computed. The social variables which had entered into step-wise regression in the previous analysis were weighted by their terminal unstandardised regression coefficients to provide, with the addition of the appropriate regression constants, predicted criterion percentages. Differences between the predicted and actual criterion percentages provided a distribution of school based discrepancy percentages for each criterion.

TABLE 1

SOCIAL PREDICTION : TERMINAL STEP-WISE SOLUTIONS FOR 7 AND 10-YEAR-OLD SCHOOLS
(decimal points omitted)

Predictors	Backwardness Criteria : 7-year-old schools (N=112)										Backwardness Criteria : 10-year-old schools (N=110)											
	Picture IQ		Reading		Maths.		Attain. comp.		Gen. comp.		Non-v. IQ		Verbal IQ		Reading		Maths.		Abil. comp.		Attain-comp.		Gen. comp.	
	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta
AGE BASED																								
Occupation	32		46	43‡	33	15	45	29†	44	31‡	28		27		22		19		29		22		27	
Overcrowding	39	24*	22		24		26		35		08	–26*	17		19		12		13		17		16	
Large families	21	–17	13		17		17		21		08		12		23		13		11		20		16	
Housing stress	17		–05	–16	20		09		13		08		02		–09	–25†	–05		06		–07	–19*	–01	
Family stress	07		20		32	22*	30	17*	23		15	18*	–04		–04		–11		05		–08		–01	
Unemployment	38	14	15		24		23		32		26		27		24	16	20		28		24		28	
Lack of hygiene	26	17	12		11		14		21		34	30‡	27	21*	14		25	15	33	27†	21		28	18*
Attendance	08		09		11		12		11		12		17	14†	15	24*	11		16	13	14	16	16	13
SCHOOL BASED																								
Attendance	–08		–09		–07		–09		–09		–06		–07		–04	14	–07		–07		–06		–07	
Free meals	41	27†	16		31		27		37		31	27†	26		27		24		31		27		30	
Unemployment	31		28		43	33‡	41	22*	41	24*	34	18*	33	28†	36	29*	36	21*	36	31‡	39	33†	40	27†
NEIGHBOURHOOD BASED																								
Occupational status	–24		–34	–20*	–31		–37	–27*	–35	–25*	–31		–20		–31	–16	–40	–26†	–27		–37	–23*	–34	–17
Housing	–13		–17		–13		–17	19	–17	17	–23	–20*	–19		–26		–27		–23		–28		–27	
100 R^2	26·6‡		27·4‡		26·2‡		33·9‡		29·3‡		29·9‡		17·3‡		24·5‡		21·7‡		22·2‡		25·0‡		23·7‡	

* : $P < 0·05$; † : $P < 0·01$; ‡ : $P < 0·001$

Discrepancy percentages which deviated by one standard error of prediction or less either way from the zero means were used to distinguish accurately-predicted schools. Discrepancy percentages which deviated by more than one standard error distinguished inaccurately-predicted schools. Thus, statistically derived ‘ accurate/inaccurate prediction ’ criteria were available for a series of step-wise regressions in which the predictor variables were descriptive of the school. Of the 30 predictors five were age-group based, 18 were school based and seven were teacher based. The regression solutions are summarised in Table 2.

Seven variables which failed to enter into regression for any criterion are omitted from the table. These were age-group based *class size* and *reading method,* school based *city/non-city, age of school, pupil amenities, library facilities* and one teacher variable, *male/female principal.* Certain other variables which appear in the table make only slight contributions.

The more predictable schools for 7-year-olds tend to be co-educational, non-rural, to have larger enrolments and to be better equipped, as checked by independent observers. The more predictable schools for 10-year-olds tend to be Protestant rather than Catholic. They also tend to have less floor space per pupil, to have larger enrolments, to be non-rural, to favour an emphasis on discovery methods and topics in mathematics, as assessed by independent observers, and to place less emphasis on homework for the age-group.

Over both age-levels the less predictable schools tend to be smaller, rural, less-well equipped, and more formal in their teaching of mathematics.

THE MORE EFFECTIVE SCHOOLS

By distinguishing the less accurately predicted from the more accurately predicted schools it was possible to demonstrate,as anticipated, that identification on the basis of social handicap tends to be less accurate in smaller, mostly rural schools. The question still to be answered is whether it is possible to identify features of the school as instrumental in ameliorating, or exacerbating, the educational impact of unemployment, low status neighbourhoods, poverty and inadequate home conditions.

To answer this question the discrepancies between predicted and actual incidence of backwardness were used as criteria in a further series of analyses. On each discrepancy continuum positive discrepancies indicated a lesser incidence than anticipated on the basis of prediction. Negative discrepancies indicated a greater incidence than anticipated. The predictors were the 30 school variables from the previous analysis and the regression solutions are summarised in Table 3.

Thirteen of the 30 predictors failed to enter into regression for any criterion and are omitted from the table. These were age-group based *boys as proportion, homework, reading method* and *maths method,* school based *city/non-city, preparatory/primary, size of school, age of school, pupil/teacher ratio, pupil amenities, library facilities* and *out-of-school activities,* with percentage of *older teachers.*

The more effective schools for 7-year-olds are distinguished by smaller classes. Thereafter, these schools tend to be streamed, to be urban rather than rural, to be Catholic rather than Protestant, to be single-sex rather than co-educational, to have lower teacher turnover rates, fewer young teachers and, for reading, more infant-trained teachers.

TABLE 2

ACCURACY OF PREDICTION : TERMINAL STEP-WISE SOLUTIONS FOR 7 AND 10-YEAR-OLD SCHOOLS.
(decimal points omitted)

Predictors	Accuracy Criteria : 7-year-old schools (N=112)										Accuracy Criteria : 10-year-old schools (N=110)													
	Picture IQ		Reading		Maths.		Attain. comp.		Gen. comp.		Non-v. IQ		Verbal IQ		Reading		Maths.		Abil. comp.		Attain. comp.		Gen. comp.	
	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta
AGE BASED																								
Boys as proportion	02		–11		–12		–07		–05		15	17	01		–09		–09		14	18	–04		–02	
Homework	18	25†	04		–01		–05		–02		01		–01		–05		–02		07		–12		–18	–19*
Maths. method	–19	–18*	00		–02		04		–03		–15	–17	–14		–27	–23*	–08		–22	–23*	–12		–11	
SCHOOL BASED																								
Rural/non-rural	–19		–11	–17	–22	–28*	–16		–10		–20		–23		–23		–18		–18		–25	–29†	–19	
Urban/non-urban	13		03		17		03		–03		08		17		20	17	13		13		21		14	
Protestant/Catholic	18		10		22		06		16		05		10		26	17	03		11		22	19*	26	28†
Coed/single sex	–06		16	24*	06	15	16	23*	16	22*	–08		–04		01		01		10		00		09	
Preparatory/primary	09		11	13	11		11		10		11		09		10		10		10		11		10	
Size of school	15		09		15		17	26*	06		22	26*	24	17	19		19	36†	18		17		14	
Floor space per pupil	–02		01		03		01		06		01		–18	–16	03		–14		–13		–05		–18	–19*
Pupil/teacher ratio	14		09		00		08		–01		15		16		14		17		21	25*	11		09	
Classroom adequacy	05		09		–24		12		04		–07	–16	–02		04		–05		00		–02		–11	–15
School equipment	21	31†	06		34	29†	21	14	14		05		20	15	19		14		18		19		14	
Age of entry	–03		–20	–21*	07		–06		–10		04		03		–07		09	17	13	21*	–03		06	
Streaming	05		–04		15	15	02		02		04		03		–01		03		00		04		–01	
Out-of-school activities	–02		–03		10		14		17	16	–02	–16	12		09		04		–04		21		12	
Home-school contact	11		–03		11		10		19	15	21		14		08		16		21	14	16		22	13
TEACHER BASED PERCENTAGES																								
Turnover	–09		09		–04		–04		–05		–09		–14	–19*	–03		–06		07		–02		–09	
Young teachers (<30)	02		–06		–06	–18	–06	–15	–08		05		09		04		–08	–25*	09		01		06	
Older teachers (>50)	00		–04		03		02		04		–13		–06		00		–04		–13		13	23*	03	
Graduate-trained	05		14	15	–08		–02		18	21*	09		06		–04		–02		–05		–04		–12	–15
Infant-trained	06		07		10		01		02		20	19	–01		06		12		11		13		11	
Married women with children	00		11	14	06		12		01		–09		–10		–09		03		–03		05		06	
100 R^2	14·4†		15·0†		20·3‡		11·9†		12·9†		16·1†		12·6†		14·0†		10·4†		18·5†		14·4†		20·4‡	

* : P<0·05 ; * : P<0·01 ; ‡ : P<0·001.

TABLE 3

MORE EFFECTIVE SCHOOLS: TERMINAL STEP-WISE SOLUTIONS FOR 7 AND 10-YEAR-OLD SCHOOLS.
(decimal points omitted)

Predictors	Discrepancy Criteria : 7-year-old schools (N=112)										Discrepancy Criteria · 10-year-old schools (N=110)													
	Picture IQ		Reading		Maths.		Attain. comp.		Gen. comp.		Non-v. IQ		Verbal IQ		Reading		Maths.		Abil. comp.		Attain. comp.		Gen. comp.	
	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta
AGE BASED																								
Class size	–28	–46‡	–17	–32†	–18	–38‡	–22	–33†	–24	–44‡	–03		–15	–21*	–11		–16		–09		–12		–15	
SCHOOL BASED																								
Rural/non-rural	–02	–31†	–07		–01	–19	–01	–24	–07	–34†	–14	–20*	–14	–30†	–20	–33‡	–08		–16	–26†	–19	–32‡	–15	–26†
Urban/non-urban	03		17	20*	09		14	15	15		11		13		14		10	17*	13		14		12	
Protestant/Catholic	–07	–19*	–03		–06	–20*	–08	–20*	–04	–15	–06		–11		06		–02		–11		02		–05	
Co-ed/single sex	–06		–16	–20*	–03		–12		–13		–05		–03		–05		–04		–06		–06		–05	
Floor space per pupil	05		–05	–16	04		–03		01	..	–19	–16	–04		–09		–13		–10		–13		–11	
Classroom adequacy........	–18		–16		–06		–18		–18		–23	–15	–31	–31‡	25	–18	–41	–39‡	–29	–25†	–35	–30†	–37	–32‡
School equipment	–08		–01		06	19	–03		–03		–13		–15		–01		–20		–16		–11		–19	
Age of entry	17		11		09		09		15		–02		–02		–03		10	15	00		02		03	
Streaming	10	17	09		14	19*	14	20*	11	18	09		–11		–03		02		–02		–02		–03	
Home-school contact	01		–09		–02		–11		–04		11		12		12		13	19*	13		17		12	
TEACHER BASED																								
Percentage turnover	02		–04		–19	–24*	–15		–10	–16	–03		–04		–02		–05		–04		–01		–04	
Percentage young teachers (<30)	01		–13	–15	–06		–15	–23*	–06		05		09		04		–03		07		05		05	
Percentage graduate-trained	07		14	16	15		18	16	10		23	24*	19	15	21	19*	16	16	24	24†	17	15	22	22*
Percentage infant-trained....	–08		19	30†	–08		02		00		07		–06		–20	–19*	–05		02		–15	–13	–08	
Percentage married women with children	16	20*	03		09		08		09		–03		01		12		07		–03		09		04	
Male/female principal	–19		–18		–11		–18	–11	–19		–15	–18	–22		–23	–23*	–27	–18*	–22	–20	–26	–22*	–28	–24†
$100\ R^2$	19·7‡		22·7‡		16·6†		22·3‡		17·1†		17·5†		19·8‡		24·2‡		29·8‡		21·6‡		26·8‡		27·3‡	

* : P<0·05 ; † : P<0·01 ; ‡ : P<0·001.

The more effective schools for 10-year-olds are distinguished by less physically adequate classrooms, as checked by independent observers. Thereafter, they tend to have female rather than male principals, a higher proportion of graduate-trained teachers, and to be located in urban rather than rural areas.

Somewhat more attainment variation is accounted for in the schools for 10-year-olds than in those for younger children. This suggests that between-school differences become increasingly important in relation to attainment backwardness. Against this, three-quarters or more of variation, depending on age and criterion, is unaccounted for by the school variables.

DISCUSSION

The 'social' analysis emphasised the importance of unemployment as a regional index of educational need. Its findings suggest that the social characteristics of the school and its surroundings carry a greater weight among older children. The practical corollary of this is that educational failure may become cumulative in low-status areas of high unemployment.

The 'accuracy of prediction' analysis showed, as anticipated, that the educational needs of smaller rural schools are less predictable from a knowledge of their social characteristics than are larger urban schools. The less predictable schools tend also to be less well equipped. Add to this the observed denominational difference and it becomes clear that, even regionally, a social index may have limited generality. As many as 70 per cent of Northern Ireland primary schools are rural, even though they accommodate less than 40 per cent of the primary school population. While it may be possible to identify with some degree of objectivity the conjunction of educational backwardness and social handicap in the cities and larger urban centres, an educational priority policy for rural schools clearly needs to be more flexible. Even at the initial stage of policy implementation, pupil-centred rather than school-centred identification may be a more efficient strategy.

The 'more effective schools' analysis suggested that smaller classes have a compensatory advantage for the younger children. The finding that the least compensatory schools are clearly advantaged in the physical superiority of their classrooms was unexpected, and therefore less easily explicable. Similar interpretative problems are posed by graduate-trained teachers and female principals, both consistently associated with the more effective schools. If we accept the consistency of the evidence we are left with the question as to how, in either case, the dynamics of compensation operate.

In all three analyses regression left much unexplained. The identification of educational backwardness on the basis of social criteria alone is clearly an inexact science, as is the attempt to distinguish between-school differences in compensatory effect on the basis of school resources or characteristics alone.

The Plowden Committee recognised, from the evidence of their own surveys, that a knowledge of the educational climates in individual homes would be a good deal more revealing than a knowledge of the socio-economic characteristics of neighbourhoods or parents. It may be hypothesised that schools are not so very different ; that a knowledge of the skills and attitudes of individual teachers may be more revealing and educationally significant than a cataloguing of physical, institutional or professional characteristics.

This hypothesis is supported by empirical evidence. Barker Lunn (1970), for example, has shown with regard to classroom organisation that the attitudes and practices of individual teachers are more important than whether or not the school professes a particular organisational policy. And when Cane and Smithers (1971) investigated the teaching of reading in the infant departments of 12 schools from working-class areas and four from middle-class areas, they concluded that the most successful schools were those in which a high degree of organised teaching was encouraged by school heads who provided clear leadership and a professional framework within which the staff could formulate and realise their teaching objectives.

There is some danger, in the context of e.p.a. policy where there is a pre-occupation with the channelling of resources, of a neglect of the more fundamental implications of findings such as these. The problem is clearly not so much one of resources as such, but rather of their appropriateness to particular conditions and their perceptive use in schools and classrooms. Teacher support, teacher motivation, and the nurturing of teaching skills appropriate to the challenge of social disadvantage may be among the more urgent priorities.

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A TYPOLOGY OF TEACHING STYLES IN PRIMARY SCHOOLS

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SUMMARY. Differences in teaching styles have conventionally been described in terms of ill-defined dichotomies. The aim of the present study was to provide a more adequate representation of teaching practices by creating a typology based on the self-reported strategies of primary school teachers. 1,258 third and fourth year teachers completed a questionnaire, and the resultant information was cluster analysed. Twelve teaching styles were extracted. Although the usual poles of informal and formal styles were apparent, most teachers appeared to adopt intermediate styles, incorporating elements of both informal and formal strategies. Evidence regarding the validity of the clusters is presented.

INTRODUCTION

MUCH research on the effects of teaching appears to have concentrated on relating what Mitzel (1957) has termed presage and product variables. Presage variables are those which teachers and pupils bring with them into the teaching situation, such as intellectual and personality characteristics, and product variables relate to the outcomes of that situation, often in the form of pupil attainment. Yet such research takes no account of what may be a crucially important set of variables, namely, differences that exist in classroom processes.

Although many of these differences have been assumed to relate to variations in teacher behaviour and the kind of learning environments they engender, a major problem of operational definition is apparent. As Travers (1971) has pointed out, " it is in this area that we have a long tradition of using sloppy and hazy variables." Most researchers, whether collecting data by subjective impression, rating scales, or systematic observation, have tended to conceptualise differences in teaching style in terms of global dichotomies. Descriptions have included formal-informal (Haddon and Lytton, 1968), direct-indirect (Flanders, 1965), teacher centred-learner centred (Withall, 1951), traditional-modern (Minuchin *et al.*, 1969), and type 1-type 2 (Barker Lunn, 1970). These labels represent, to paraphrase Flanders (1965), but a short stroll in the conceptual garden ; an overnight hike could extend the list indefinitely.

Not only are these terms often ill-defined, but the *same* terms are used to refer to different aspects of the classroom situation, and *different* terms to refer to essentially the same aspects. Herbert (1967), in commenting on the confusion apparent in the literature of teaching, stated that the term ' teaching method ' had no stable meaning, and concluded that " descriptions of particular methods are too vague or inconsistent to permit an observer to distinguish them in practice."

This practice of categorising all teacher behaviours in terms of ill-defined dichotomies is not likely to lead to further progress in the evaluation of teaching styles. Simon (1972) has suggested that classroom data need to be subjected to some form of multivariate analysis to enable a conceptualisation of the observed variability which reaches far beyond such widely used labels as progressive and traditional. Stake (1970) has expressed similar views, arguing that what is needed is " some easy to administer, easy to understand, not very controversial, but valid, method of describing teaching . . . Common prose is not the answer. There is some general understanding when one says ' lecture,' or ' authoritarian style,' or ' discovery method,' but also misunderstanding." He recommends the development of multidimensional typologies of teaching styles. " Educators are offended by typologies that . . . might lead to some greater understanding of what is happening in the classroom. To call a Professor ' Type III,' or even ' Type 3-16-4-0-9 ' is to invite being spat on. Yet the need for description, classification, and even over-simplification, is apparent."

The present study attempts to provide such a typology based on the self reported teaching strategies of primary school teachers. The task was conceived in three stages :

(1) To provide a more adequate theoretical and experiential conceptualisation of the elements constituting teaching styles.

(2) To design, on the basis of this conceptualisation, a questionnaire to elicit objective information on a wide range of teaching practices.

(3) To create, on the basis of this information, a typology of teaching styles by the use of cluster analysis.

METHOD

In an attempt to overcome the problem of definition of terms, a review of relevant educational and psychological theory was undertaken. This included an examination of the philosophy underlying child-centred or progressive education, the progressive education movement, and their critics. It involved an examination of psychological theories of learning and the controversy surrounding discovery learning, and also an examination of relevant educational reports, particularly the Hadow Report (1931) and Plowden Report (1967). These sources were supplemented by information gained from interviews with head and class teachers in primary schools, which provided the practitioners' perceptions of the elements constituting different teaching approaches.

From these diverse sources it was possible to isolate the elements involved in the global terms ' progressive ' and ' traditional.' These elements were translated into classroom behaviours and then into questionnaire items. The questionnaire finally contained six major areas :

Classroom management and organisation.
Teacher control and sanctions.
Curriculum content and planning.
Instructional strategies.
Motivational techniques.
Assessment procedures.

Two pilot studies were carried out to enable the reduction and modification of ambiguous items. The final form contained 28 items, although a number were in multiple form. For example, one question required a breakdown of the time spent on every aspect of the syllabus in the last full week prior to completing the questionnaire. The final form was included as a separate section within a larger questionnaire concerning details of school, teachers, and teacher attitudes administered as the first phase of an on-going project financed by the SSRC. (Copies of the questionnaire are available on request.)

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Sample.

Since the major aim was to create a classification of teaching styles, it was considered necessary to gain a large and representative sample. An attempt was, therefore, made to carry out a census of all teachers taking third and fourth year primary classes in the new administrative counties of Lancashire and Cumbria. This gave a sampling frame of 871 schools representing some 1,500 teachers.

The questionnaires were posted to each head teacher for distribution to the class teachers. In addition to a covering letter explaining the purposes of the study, each class teacher was provided with a separate envelope in which to seal the completed questionnaire. This procedure was adopted to ensure complete confidentiality. After two follow-up letters 88 per cent of schools responded, producing a sample of 1,258 teachers. A further 3 per cent wrote explaining their inability to take part.

RESULTS

The item response levels of third year, third and fourth year mixed, and fourth year teachers, were analysed separately to assess differences due to age of pupils taught. A striking similarity of response to most items was apparent suggesting that, overall, differences in age level taught has little effect on teaching style. The analysis also indicated that a small number of items should be removed from further analyses, either because of poor discrimination, or because a high proportion of teachers had been unable to make a clear decision on the alternatives. The general picture of primary school practice provided by this analysis is being described elsewhere (Bennett, 1975).

The typology reported here is based on the 468 fourth year teachers· Similar analyses have since been carried out for the other year groups with similar results. The cluster analysis was preceded by a principal components analysis and a varimax rotation in order to meet two essential prerequisites of clustering techniques. Firstly, it is necessary that the variables are relatively independent of one another so that basic dimensionalities do not override the calculations of the similarities of subject profiles. The principal components analysis demonstrated that a basic dimension did not exist. A complex pattern of interaction between the variables was apparent, the first component accounting for only 11 per cent of the variance. Secondly, it is necessary to ensure that groups of variables are not overweighted in the analysis, and so a varimax rotation of the 28 questionnaire items was computed in which seven factors were extracted with eigen values in excess of unity. To represent these factors a total of 19 items were chosen as input to the cluster analysis. A varimax rotation of these 19 items is shown in Table 1.

Factor I is clearly an assessment factor, including frequency of tests and homework.

Factor II concerns teaching mode, particularly with respect to group work.

Factor III relates to the physical control of the classroom.

Factor IV distinguishes between subject centred and integrated curriculum organisation.

Factor V appears to be a teacher control factor, relating to restriction of movement and talk, smacking for disruptive behaviour and teacher talk.

Factor VI again concerns teaching mode, but here with respect to pupil choice of work.

Factor VII relates to extrinsic motivation, although it is not clear why item 13 loads highly on this factor.

Varimax rotations were also computed for the third, and third and fourth mixed, groups. The level of agreement among the three groups was very high. Six of the seven factors appeared in each group with only minor variations in loadings.

TABLE 1

FACTOR LOADINGS AFTER VARIMAX ROTATION.

	I	II	III	IV	V	VI	VII
1. Pupils have choice in where to sit			78				
2. Pupils allocated to seating by ability			–75				
3. Pupils not allowed freedom of movement in the classroom					–48		
4. Teacher expects pupils to be quiet					–57		
5. Pupils taken out of school regularly as normal teaching activity				–45			
6. Pupils given homework regularly	–50						
Teaching emphasis :							
7. (i) Teacher talks to whole class					–59		
8. (ii) Pupils work in groups on teacher tasks		79					
9. (iii) Pupils work in groups on work of their own choice		48				55	
10. (iv) Pupils work individually on teacher tasks		–79				–35	
11. (v) Pupils working individually on work of own choice						85	
12. Pupils' work marked and graded							–52
13. Stars given to pupils who produce best work							–35
14. Arithmetic tests given at least once a week	–79						
15. Spelling tests given at least once a week	–78						
16. Teacher smacks for persistent disruptive behaviour					–66		
17. Teacher sends pupil out of room for persistent disruptive behaviour							73
Emphasis in allocation of teaching time							
18. (i) Separate subject teaching				83			
19. (ii) Integrated subject teaching				–86			

Cluster Analysis.

Cluster analysis calculates coefficients of similarity between subjects across all variables. The user may specify the number of groups or clusters of subjects to which he wishes the data to be reduced. When the subjects are people, such groups are often denoted ' types ' which McQuitty (1967) defines as " a category of persons wherein everyone in the category is more like every other person in the category than he is like any other person in any other category."

There are many forms of cluster analysis (Wishart, 1970) allowing the selection of the fusion technique and similarity coefficient most suitable for the kind of data to be analysed. The fusion technique adopted here was iterative relocation, where, at each level of clustering, cases are reconsidered for removal to a different ' parent ' cluster if fusion has altered the nature of the cluster definitions. The coefficient of dissimilarity chosen was error—sum of squares (ΣD^2, where D is the euclidean distance between cases for each variable). This distance function is strongly recommended for questionnaire data by Wishart (1970) and Brennan (1972).

TABLE 2

CENTRAL PROFILES (PERCENTAGE OCCURRENCE) AT 12 CLUSTER LEVEL.

Item	Type of Teaching Style											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Pupils have choice in where to sit	63	66	17	46	50	18	7	17	3	7	77	00
2. Pupils allocated to seating by ability	14	16	25	0	12	45	20	7	81	58	3	50
3. Pupils not allowed freedom of movement in the classroom	49	38	83	76	100	84	87	100	86	97	97	100
4. Teacher expects pupils to be quiet	31	34	92	61	23	55	56	90	81	74	90	100
5. Pupils taken out of school regularly as normal teaching activity	51	50	83	49	81	45	17	47	31	19	26	42
6. Pupils given homework regularly	9	22	8	27	65	3	13	43	36	29	·21	56
Teaching emphasis 7. (i) Teacher talks to whole class	29	16	79	58	30	74	83	73	33	94	85	70
8. (ii) Pupils work in groups on teacher tasks	46	13	83	12	77	92	3	3	22	68	10	8
9. (iii) Pupils work in groups on work of own choice	89	3	29	94	19	32	13	· 3	0	23	0	0
10. (iv) Pupils work individually on teacher tasks	9	97	0	3	42	0	73	83	100	0	72	92
11. (v) Pupils work individually on work of own choice	94	9	42	85	42	18	57	57	8	3	8	28
12. Pupils' work marked and graded	3	3	13	15	31	16	33	33	8	32	31	97
13. Stars given to pupils who produce best work	9	31	38	55	8	18	17	73	17	87	69	75
14. Arithmetic tests given at least once a week	9	9	71	88	100	8	10	70	50	94	56	81
15. Spelling tests given at least once a week	23	19	67	94	92	18	7	73	92	94	87	92
16. Teacher smacks for persistent disruptive behaviour	34	34	96	24	31	45	80	93	42	68	64	58
17. Teacher sends pupil out of room for persistent disruptive behaviour	11	25	13	6	8	3	7	10	25	0	33	11
Emphasis in allocation of teaching time 18. (i) Separate subject teaching	20	31	4	82	81	95	100	47	81	100	100	92
19. (ii) Integrated subject teaching	97	91	100	24	65	8	10	93	14	7	0	0
(N in cluster)	(35)	(32)	(24)	(33)	(26)	(38)	(30)	(30)	(36)	(31)	(39)	(36)

The central profiles of all solutions from 22 to 3 clusters were examined, and the 12 level chosen since at this level between-cluster distances were maximised in relation to within-cluster error.

Table 2 shows the distribution of responses for each of the 19 items for the 12 clusters. Figures in heavy type show response patterns which are considered significantly different from the total population distribution.

The twelve ' types ' or teaching styles are described as follows :

Type 1.

These teachers favour integration of subject matter and, unlike most other groups, allow pupil choice of work whether undertaken individually or in groups. Most teachers in this cluster allow pupils choice of seating ; less than half curb movement and talk. Assessment in all its forms, tests, grading, and homework appears to be discouraged while intrinsic motivation is favoured.

Type 2.

These teachers also prefer integration of subject matter. Teacher control appears to be low, but there is less pupil choice of work. However, most of these teachers allow pupils choice of seating, and only one-third curb movement and talk. Few test or grade work.

Type 3.

This group favours class teaching and group work. Integration of subject matter is preferred and pupils are taken out of school. These teachers appear to be strict ; most of them curb movement and talk and smack children who step out of line. The amount of testing is average, but grading and homework are below average.

Type 4.

These teachers prefer separate subject teaching, but a high proportion allow pupil choice of work both in groups and individual work. None seats pupils by ability. They test and grade more than average.

Type 5.

A mixture of separate subject and integrated subject teaching is characteristic of this group. The main teaching mode is pupils working in groups of their own choice on tasks set by the teacher. Teacher talk is lower than average. Control is high with regard to movement, but not to talk. Most give tests every week and many give homework regularly. Stars are rarely used as rewards. Pupils are taken out of school regularly.

Type 6.

These teachers prefer to teach subjects separately, with emphasis on groups working on teacher-specified tasks. The amount of individual work is small. These teachers appear to be fairly low on control, and are below average on assessment and the use of extrinsic motivation.

Type 7.

This group teaches separate subjects, using class teaching together with individual work. Teacher control appears to be tight ; few allow movement or choice of seating, and offenders are smacked. Assessment is, however, not used much.

Type 8.

This group of teachers has very similar characteristics to those in type 3, but they prefer to organise the work on an individual rather than a group basis. Freedom of movement is restricted and most of the teachers expect pupils to be quiet.

Type 9.

These teachers favour separate subject teaching, with pupils mainly working on tasks set by the teacher. Teacher control appears to be high ; most curb movement and talk, and seat by ability. Pupil choice is minimal. Regular spelling tests are given, but few mark work or use stars.

Type 10.

The teaching mode favoured by this group is teacher talk to whole class within separate subjects. Pupils work in groups determined by the teacher on tasks set by her. Most teachers in this cluster curb movement and talk, and over two-thirds of them smack for disruptive behaviour. There is regular testing and most of them give stars for good work.

Type 11.

All members of this group stress separate subject teaching by way of class teaching and individual work. Pupil choice of work is minimal, although most teachers allow choice of seating. Movement and talk are curbed, with smacking used as punishment.

Type 12.

This is an extreme group in a number of respects. None favours an integrated approach. Subjects are taught separately by class teaching and individual work. None of the teachers allows pupils choice of seating and every teacher curbs movement and talk. These teachers are above average on the use of all assessment procedures and extrinsic motivation predominates.

The types have been placed, for the sake of clarity, in increasing order of ‘ formality.’ This procedure may suggest that the cluster can be represented by points along a continuum of ‘ progressive-traditional,’ but this would be an over-simplification. The extreme types could be adequately described in these terms, but the remaining types all contain elements of both ‘ progressive ’ and ‘ traditional ’ practices.

DISCUSSION AND CONCLUSION

This analysis has provided some indication that the ubiquitous use of dichotomous descriptions of teaching style fails to take into account the multiplicity of strategies involved. When construed unidimensionally as ‘ progressive’ or ‘ traditional,’ only a minority of teaching styles are adequately described. The majority of the teachers in this sample appear to adopt mixed strategies for which the ‘ progressive-traditional ’ dichotomy provides inappropriate description. Cluster analysis has provided a more detailed multi-dimensional description of the intermediate styles.

Some evidence is available about the validity of the teachers’ responses to the questionnaire and, therefore, of the clusters evolved. Thirty-six teachers, whose responses most closely matched the central profiles of seven of the 12 clusters, have agreed to participate in a second on-going stage of the project.

Research staff visited each of these classrooms in the course of data collection and were asked to describe each of them in terms of the items in the questionnaire. Although they were unaware of the cluster memberships of the teachers, their reports closely related to the types described above. In addition, primary school advisers from the education authorities visited these same classrooms and reported their observations again in terms of the questionnaire items. There was an 80 per cent agreement between their ratings and the cluster descriptions.

Evidence of validity has also been derived from a content analysis of essays written by all the pupils in these 36 classes. The title was ' What I did at school yesterday,' and pupils were asked to record as accurately as possible all that had occurred. These analyses are not yet complete but early indications are that a strong relationship exists between these descriptions and the cluster descriptions (Bennett, 1975). Taken together these indications of validity present encouraging evidence for the reality of the teaching styles identified.

The typology makes possible a comparison between teaching practice and current conceptions of that practice. The Plowden Report (1967) described a pattern of teaching which the committee saw as representing a general and quickening trend. It was stated that the primary school " sets out deliberately to devise the right environment for children, to allow them to be themselves, and to develop in a way, and at a pace appropriate to them . . . It lays special stress on individual opportunities for creative work. It insists that knowledge does not fall into neatly separate compartments and that work and play are not opposite but complementary." The report endorsed pupil-chosen activity, rather than class teaching, so that the teacher could adopt a consultative, guiding, stimulating role rather than a purely didactic one. Project work, centres of interest, and integration of subject matter were suggested together with visits outside the school to allow children to experience their immediate environment. Extrinsic rewards such as marks and stars were deprecated in favour of strengthening children's intrinsic interest in learning. Punishment was severely frowned upon, being linked with ' psychological perversion.' Group work, communication between children in class, and non-streaming, were all to be encouraged.

Later writers have quantified this ' general trend.' Blackie (1967) maintained that a third of primary schools were working along these lines, and Silberman (1970), drawing upon the work of Rogers (1970), felt safe in saying that 25 per cent of English primary schools fitted the Plowden model, and that another third were moving towards it. Simon's (1972) study did not substantiate this trend, however, and neither do the findings reported here. Only Type 1 corresponds closely to the Plowden definition, containing just 9 per cent of the sample studied. A separate analysis of third year teachers isolated similar types, and the corresponding group at this level contained only 8 per cent of that sample.

It could, of course, be argued that the sample studied is not representative of British primary teachers as a whole. This may be true, but the study of teaching practices conducted by HMIs for the Plowden Committee reported little regional variation. These findings together with those provided by Simon indicate that progressive teaching may be much less prevalent than has hitherto been supposed.

Finally, a note of caution about the use of cluster analysis may be necessary. This study has demonstrated the value of this relatively untried statistical technique in creating meaningful types of teaching style. Its utility cannot be denied, but there are still uncertainties about the most appropriate similarity coefficients to use with differing kinds of data (Sokal, 1966), and these uncertainties should be borne in mind in assessing the clusters reported in this study.

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PERSONALITY CHARACTERISTICS OF SYLLABUS-BOUND AND SYLLABUS-FREE SIXTH-FORMERS

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SUMMARY. 218 upper sixth-formers at three West Riding schools were given a battery of tests and questionnaires designed to investigate relationships between personality and syllabus-boundness/syllabus-freedom. A 20-item inventory was developed and used to isolate groups of 28 sylbs and 31 sylfs. In terms of Cattell's 16PF, the sylbs were found to be significantly more conservative, controlled, conscientious and persistent, shy and cautious, and practical, and somewhat more sober, apprehensive, and group dependent. The sylbs were also found to be more dogmatic on Rokeach's scale and the suggestion is made that sylbism may be an aspect of dogmatism. In contrast to previous research, no evidence was found to link syllabus-orientation to convergence/divergence. Sylbs were found to be more conscientious in their study habits and to do better in O-level examinations.

INTRODUCTION

A NUMBER of recent studies have investigated relationships between personality factors, study methods, and academic motivation and attainment. Entwistle (1972, 1973) has provided thorough analyses of the main directions of these studies, and he and other researchers have indicated that a useful conceptualisation has emerged from what are known as the syllabus-bound and syllabus-free orientations.

The terms ' syllabus-bound ' and ' syllabus-free ' seem to have been first employed by Hudson in *Frames of Mind* (1968). The former was applied to those who " bend their wits almost exclusively to getting good examination marks " and who " accept the restrictions that a syllabus imposes " ; the latter term was used to describe those who " focus on the syllabus only with difficulty and have intellectual interests that range far beyond it " and who " resent or ignore " the restrictions of a syllabus. Hudson used the convenient abbreviations ' sylb ' and 'sylf' to describe the contrasting personalities and these terms are used here ; so too are ' sylbism ' and ' sylfism ' to refer to the constructs involved. Hudson's (1968) interest in sylbs and sylfs was really a digression from his main concern which was with convergers and divergers. He found a close relationship between convergence and sylbism, and divergence and sylfism.

In *Frames of Mind*, Hudson acknowledged his debt to Parlett with whom he had worked on sylbs and sylfs. Parlett (1970) in a study of students at the Massachusetts Institute of Technology found that sylbs were " more orientated towards exams than other students and less likely to be governed by strong personal interests and commitments." Parlett also made classroom studies and found that sylbs attended more sessions, completed more homework, were more likely to sit at the front of the class, did better in examinations (although not significantly so), but were less successful when individual projects were pursued. He also found evidence linking sylbism with convergence, and sylfism with divergence. While reluctant to draw firm conclusions, Parlett suggested : " What is certain at this stage is that, while some students operate successfully within the organised system of instruction and are satisfied with its rewards, others are different ; they regard the system as coercive and wish to organise their academic lives in accord with their curiosity and interests."

A recent study by Smithers *et al.* (1975) of syllabus-boundness and syllabus-freedom at the university level has suggested, in support of Hudson (1968) and Parlett (1970), that one expression of convergence/divergence is the degree to which the restrictions imposed by the syllabus are accepted or rejected. The sylbs and sylfs were found to differ in their occupational interests—the sylbs having stronger codifying classifying interests, the sylfs, verbal and aesthetic interests—in a manner similar to the differences between convergers and divergers reported by Smithers and Child (1974b). The sylbs were also found to be somewhat more introverted and neurotic.

Personality studies of convergence and sylbism have not, however, been conclusive. Hudson (1968) found no relationship between convergence and introversion and this is supported by Smithers and Child (1974a). The personality correlates of sylbism do not appear to have been much investigated, but Entwistle (1972) cites the work of John who found sylbism and introversion to be significantly associated. Entwistle *et al.* (1974) have suggested that moderate scores on syllabus-boundness are associated with high academic performance but extreme scores may indicate obsessiveness and neurosis. They also indicated that syllabus-freedom can be liberating for imaginative thought but at the limit it may lead to aggressive intolerance of conventional standards or to paranoia.

The differences between sylbs and sylfs bring to mind Rokeach's (1960) work on dogmatism. Rokeach suggested that dogmatism is characterised by: a closed way of thinking, an authoritarian outlook on life, intolerance towards those of opposing belief and sufferance of those of similar belief. He provided evidence that dogmatics are likely to have a strong tendency to conform, strong control over feelings and impulses, a tendency towards inflexibility in thinking, a dependence on authority, and a general need to feel the environment is highly predictable. There seems a strong hint here of close links between sylbism and dogmatism, a relationship not specifically considered in previous research, although suggested by Biggs (1970) in a study mainly concerned with examining differences between arts and science 'faculty patterns.' The possibility emerges that sylbism may be a particular aspect of dogmatism.

It may well be that the effects of sylbism and sylfism are of more significance within the sixth-form than in other areas of education ; O-level pupils, for example, are almost by definition largely bound by the syllabus, while college and university students have more freedom to incline towards sylfism. The considerable attention presently being paid to changes and developments in the organisation, curricula and examinations of the sixth-form appears surprisingly rarely to include consideration of the effect on performance of aspects of the personality of the individual sixth-former. This paper attempts to examine the characteristics of sixth-form sylbs and sylfs and to compare them with those of sylbs and sylfs found in other populations, emphasis being given to those personality traits that might be worthy of further attention in the current reappraisal of the sixth-form.

METHODS

Sample.

The study is based on an opportunity sample of 218 second-year sixth-formers at three schools in the West Riding :

School A, with a four-form selective entry and an 11-18 age range.

School B, now a 12-form entry upper comprehensive school, but with the present second-year sixth form made up mainly of girls from the old, selective girls' grammar school, together with some boys and girls transferred from other selective and non-selective schools at 14 or 16.

School C, with a five-form selective entry and an 11–18 age range.

About 82 per cent of the total second-year sixth-form population provided information about themselves and completed a battery of questionnaires under normal test conditions. The remaining 18 per cent were absent from school owing to illness, interviews or examinations. Details of the sample are given in Table 1.

TABLE 1

COMPOSITION OF SIXTH FORM SAMPLE.

School	Boys	Girls	Total	Total in Second year Sixth	% response
A	37	29	66	87	76·0
B	16	53	69	82	84·1
C	39	44	83	95	87·3
Total	92	126	218	264	82·4

Tests.

Included in the battery of questionnaires and tests were :

Personal Details and Backgrounds : This provided information on examination results, examinations being taken, prospective further education or employment, father's occupation, number of hours spent on homework and study.

Cattell's 16 *PF Questionnaire* (Form C) (Cattell, Eber and Tatsuoka, 1970).

Rokeach's Test of Dogmatism (Form E) (Rokeach, 1960).

Divergent Thinking Tests. ' Uses of Objects ' (Getzels and Jackson, 1962) and ' Consequences ' (Torrance, 1962). The ' Uses ' and ' Consequences ' tests were scored for fluency.

Sylb-Sylf Inventory. This was developed as described in Josephs (1973). A pool of 70 items was established by drawing on items from existing questionnaires of a related type (Hudson, 1968 ; Parlett, 1970 ; Entwistle *et al.*, 1971, and Sayles, 1972) and making additions of particular relevance to sixth-formers, covering such things as private study, 'free' periods, and methods of setting and marking work. Twenty-five items selected by five independent judges as having the greatest degree of face validity on the basis of detailed profiles drawn up from Hudson's (1968) and Parlett's (1970) descriptions were used to form a scale by means of which two 'extreme' groups with scores one standard deviation from the mean were isolated. In this way 32 sylbs and 30 sylfs were provisionally identified.

These two groups were then used to compare responses on each of the original 70 items. Twenty-one of the 25 items gave significant differences at the ·5 per cent level ($P<0{\cdot}005$; chi-squared value 7·88). Four items had chi-squared values of 4·1, 4·5, 1·5 and 5·9 respectively, well below the levels of significance achieved by the rest of the 25. These items were eliminated from the final pool which was to form the sixth-form sylb-sylf inventory. Another item, which achieved the next lowest chi-squared value of 8·0, was also eliminated in order to bring the final pool of items to 20. These are listed in the appendix. Only six of the other 45 items discriminated at the ·5 per cent. level.

Of the 20 items selected for the final inventory, 13 were taken from Hudson's (1968) syllabus-bound/syllabus-free questionnaire ; six of these formed part of his sylb/sylf cluster and all three of his ' conscientiousness ' cluster are included. Of the other seven items, one was modified from Parlett's (1970) syllabus-bound scale, two were taken from Entwistle *et al's* (1971) motivation scale and one from their ' lack of distractions ' scale, one came from Sayles' (1972) additional sylb/sylf items, and two from the group of items added as being specially relevant to the sixth form.

The internal consistency of the scale was investigated using Pearson product-moment coefficients of linear correlation, corrected for the effects of halving the number of items by the Spearman-Brown formula. The corrected coefficient of 0·75, achieved by using the equivalent form method favoured by Thorndike (1951), is close to the maximum obtainable for a scale made up of ' n ' dichotomous items with a mean about half way along the scale and a standard deviation of about 0·20 n (Adams, 1964). (In this case the mean is 10·9 and the standard deviation 3·8).

Some evidence of validity was obtained by comparing the scores on the sylb/sylf inventory with different measures of syllabus-boundness/-freedom—the sylb/sylf thermometer scales described below—and with items relating to hours spent on homework. Table 2 shows that there was quite good agreement between the different tests. Table 3 indicates that both hours spent on homework ($P < \cdot 001$) and the proportion of private study time spent in study ($P < \cdot 01$) were related to syllabus-boundness as measured by the inventory.

TABLE 2

CONCURRENT VALIDATION OF INVENTORY.

	Sylbs (N=28)		Sylfs (N=31)		t	P
	M	SD	M	SD		
Thermometer 1 (Student)	4·59	2·49	6·83	2·19	3·68	·001
Thermometer 2 (Teacher)	5·20	1·93	2·38	1·98	5·53	·001
Thermometer 3 (School)	6·33	2·72	7·89	2·21	2·43	·05
correlations (N=218)					r	P
Sixth-Form Sylb-Sylf Inventory/Thermometer 1					−0·348	·01
Sixth-Form Sylb-Sylf Inventory/Thermometer 2					0·352	·01
Sixth-Form Sylb-Sylf Inventory/Thermometer 3					−0·205	·01

Construct validity was examined by principal components analysis using a Birmingham program (Hallworth and Brebner, 1965). The sylb/sylf inventory was found to load above 0·3 only on the first factor, and, in descending order, the other variables loading on this factor were Factor G of Cattell's 16 PF (expedient-conscientious) ; Thermometer 1 (student) ; Factor Q_3 (casual-controlled) ; Thermometer 2 (teacher) ; attitudes to school ; M.D. Factor ; hours spent on homework ; proportion of free periods spent on study ; Factor I (toughminded-tenderminded) ; Thermometer 3 (school) ; Factor Q_1 (conservative-experimenting).

Sylb-Sylf 'Thermometer' Scales. Subjects were asked to place an 'X' at that point on a line A–B exactly 10 cms. long which corresponded with their personal preferences concerning two extreme types of

(*a*) student ; (*b*) teacher ; (*c*) school

believed to represent a syllabus-bound or a syllabus-free orientation. Thus, the two poles of the 'student' scale were marked : "Student A reads all the set books, does not get distracted easily and is annoyed if teachers do not spend most of the time on preparing the class for exams." and "Student B reads things that catch his attention, even though they may not have anything to do with exams. He often wishes teachers would help him forget exams by making lessons more varied in content."

Similar descriptions were used to label the poles of the other two scales. To avoid response set, the first and third questions were oriented in one direction and the second in the opposite direction. Thus, a sylb would be expected to come much closer than a sylf to 'A' with regard to the descriptions of the student and the school, and closer to 'B' with regard to the teacher. The scales were scored by measuring with a ruler the position of the 'X' from point 'A'.

Attitude to School Questionnaire was derived from an attitude to science questionnaire developed at the NFER (1970). The effectiveness of the original scale is well established, but our major modification can only be taken as a rough guide of attitude to school.

RESULTS

The two groups identified on the basis of the refined sylb/sylf inventory (28 sylbs and 31 sylfs) were compared to see what personality and other differences existed between them. Two tables (Tables 3 and 4) are presented, one showing details of the χ^2 tests and the other, the 't'-tests. The results are considered under five headings :

TABLE 3

χ^2 TESTS, INCORPORATING YATES' CORRECTION.

Variables	Sylbs (N=28)	Sylfs (N=31)	χ^2	df	Sig. level
Male	6	14			
Female	22	17	2·71	1	NS
School A	5	8			
School B	11	13			
School C	12	10	0·89	2	NS
'Non-manual' background	10	14			
'Manual' background	18	17	0·22	1	NS
Science course	9	3			
Non-science course	13	22			
Mixed course	6	6	5·17	2	NS
Hours per week on homework 0–7	3	18			
8+	25	13	12·40	1	P< ·001
Proportion of 'free' periods on study above ½	24	15			
½ and below	4	16	7·56	1	P< ·01
Ideas on future career specific or general	25	20			
vague or none	3	11	3·71	1	NS

(1) *Personal background.*

Although there are signs that the sixth-form boys are less likely than girls to be sylbs the result did not reach statistical significance. No significant differences were found with regard to social-class background, the school attended, or the courses being followed. Nor was the apparent tendency for sylbs to be more likely to be scientists significant.

(2) *Academic attainment.*

The O-level examination would appear likely to favour sylbs more than sylfs and the expected result occurred when performances were compared ($P < \cdot 05$).

(3) *Attitudes to school.*

The questionnaire showed the sylbs' response to be clearly more favourable ($P < \cdot 01$).

TABLE 4

T-TESTS (POOLED VARIANCE FORMULA) : 57 DEGREES OF FREEDOM.

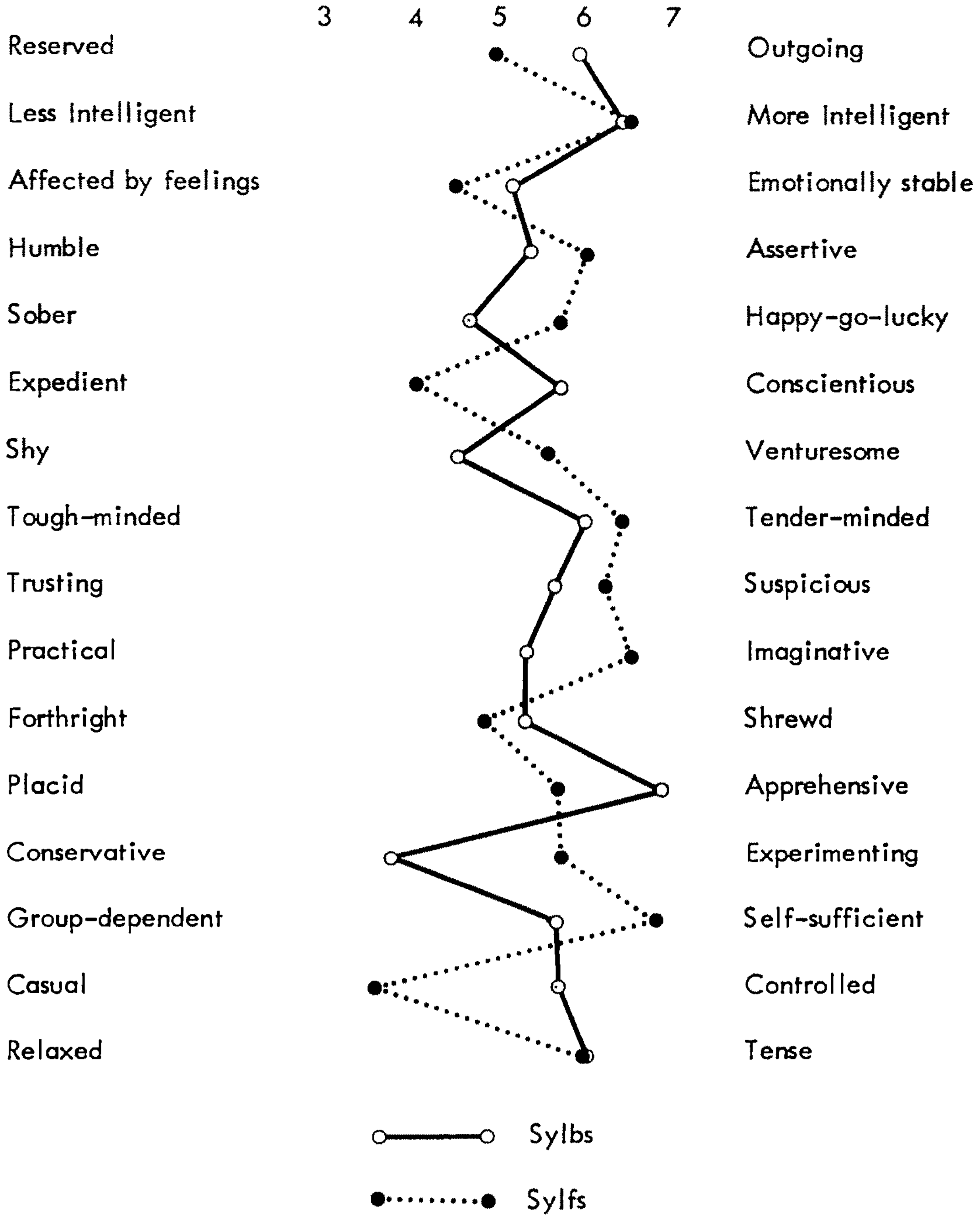
Variable	Sylbs		Sylfs			
	Mean	SD	Mean	SD	't' ratio	P
Dogmatism	167·93	19·26	155·39	20·92	2·39	0·05
16 PF Factors :						
A (Reserved-Outgoing)	5·96	2·08	5·16	1·81	1·58	NS
B (Less-More Intelligent)	6·61	1·66	6·71	1·66	−0·23	NS
C (Affected by feelings—Emotionally stable)	5·12	1·79	4·65	2·18	0·90	NS
E (Humble-Assertive)	5·29	2·11	6·06	2·39	−1·31	NS
F (Sober–Happy-go-lucky)	4·71	2·09	5·74	2·35	−1·77	NS
G (Expedient–Conscientious)	5·75	2·10	4·03	1·83	3·36	0·01
H (Shy–Venturesome)	4·36	2·16	5·65	2·27	−2·23	0·05
I (Tough-minded–Tender-minded)	6·04	1·55	6·42	2·31	−0·73	NS
L (Trusting–Suspicious)	5·75	1·76	6·29	2·37	−0·99	NS
M (Practical–Imaginative)	5·46	2·06	6·71	2·47	−2·10	0·05
N (Forthright–Shrewd)	5·46	1·55	4·90	1·87	1·25	NS
O (Placid–Apprehensive)	6·89	2·01	5·81	2·63	1·76	NS
Q_1 (Conservative–Experimenting)	3·86	2·01	5·84	2·25	−3·55	0·001
Q_2 (Group-dependent–Self-sufficient)	5·79	1·89	6·90	2·57	−1·87	NS
Q_3 (Casual–Controlled)	5·79	2·33	3·68	1·81	3·91	0·001
Q_4 (Relaxed–Tense)	6·10	2·41	6·16	2·42	−0·10	NS
MD (Motivational Distortion)	4·54	1·99	3·29	1·70	2·60	0·05
Divergent Thinking Tests :						
'Objects'	27·10	10·32	29·65	11·57	−0·89	NS
'Consequences'	10·43	2·87	10·32	2·88	0·15	NS
School Attitudes Questionnaire	70·57	9·90	63·29	8·68	3·01	0·01
Number of O-level passes	6·89	2·13	5·61	1·83	2·48	0·05

(4) *Future career.*

The sylfs seemed to be less certain about their futures, but the difference did not reach statistical significance.

FIGURE 1

Profiles of 'Sylbs' and 'Sylfs'



(5) *Personality characteristics.*

Personality profiles of sylbs and sylfs in terms of Cattell's 16 PF are shown in Figure 1, with the statistical comparisons being made in Table 4. The sylbs seem to be more conservative (Factor Q_1 ; $P<0.001$), more controlled (Q_3 ; $P<0.001$), more conscientious and persistent (G ; $P<0.01$), more shy and cautious (H ; $P<0.05$), and more practical (M ; $P<0.05$) ; and also somewhat more sober (F ; $t=1.77$), more group dependent (Q_2 ; $t=1.87$) and more apprehensive (O ; $t=1.76$).

Factor B, however, provided no evidence of a difference in intelligence. Nor did the divergent thinking tests show any differences.

Of particular relevance to this study was the significant difference found between the sylbs and sylfs in levels of dogmatism.

DISCUSSION

The research began with the acceptance of Hudson's (1968) delineation of two contrasting groups, the one accepting and the other rejecting the restrictions imposed by the syllabus.

There are some signs that sixth-form girls are more likely than boys to be sylbs but, in terms of statistical significance, Sayles' findings (1972) that no significant differences occur with regard to sex or social-class background have been supported. There was some slight indication that sylbs are more likely to opt for science courses but the difference could have occurred by chance.

The inquiry has also found that the sylbs have a more favourable attitude to school. Taken together with the strong relationship found between sylbism and Cattell's Factor G (conscientiousness), this suggests that Hudson's (1968) and Parlett's (1970) rejection of a link between sylbism and conscientious study habits may have been somewhat premature. This is further supported by the fact that six of the items from Entwistle *et al's* (1971) study habits inventory included in the original 70-item pool discriminated between the sylbs and sylfs at the $P<0.05$ level. Sylbs did better in the O-level examinations.

Interpreting Cattell's personality dimensions, as described in the *Manual for the 16PF* (1972), fairly freely, it is possible to draw up contrasting profiles for sylbs and sylfs. In comparison with the sylf, the sylb is likely to be conservative in temperament and attitude, respecting established ideas and accepting the ' tried and true ' in spite of inconsistencies. He is keen to do the right thing and is able to keep his head in emergencies, but tends to be unimaginative. He is also likely to be controlled, socially precise, conscientious, persistent and determined. A degree of shyness and emotional caution are also noticeable. He tends to be anxious and introspective, and can be dour and pessimistic. He is inclined to be group dependent, but he may not be gregarious by choice, needing to draw support from a group.

On the other hand, the personality of the sylf is likely to be particularly marked by a desire to follow his own urges, an interest in intellectual matters and experimentation, critical thinking, and carelessness of social rules. Expedience, self-indulgence and slackness may accompany imaginativeness, unconventionality, adventurousness and impulsiveness. He is likely to be thick-skinned and self-confident, well able to withstand the wear and tear of dealing with people. He tends to be cheerful and talkative, but is also temperamentally independent, accustomed to going his own way. He is resilient and secure, but to the point of being insensitive.

These descriptions are redolent of Eysenck's (1964) personality dimensions and suggest that sylbs may be neurotic introverts, and sylfs, extraverts. However, previous studies have been inconclusive in respect of possible connections, although John, as reported in Entwistle (1972), has demonstrated a relationship between sylbism and introversion. Smithers *et al.* (1975) have also found sylbs at university to be somewhat more introvert and neurotic than sylfs, but not significantly so. A detailed examination of Cattell's personality dimensions suggests that the constructs of extraversion and neuroticism may be too general to capture all the nuances of difference between the sylbs and sylfs. An invia-exvia second order factor may be obtained from the 16PF based on Factors A, E, F, H and Q_2, and, of these, only Factor H produced a result significant at the 5 per cent level, although Factors F and Q_2 only just fell short of statistical significance. Thus, insofar as there are differences, the sylbs seem to be more shy and sober—characteristics normally associated with introversion—but also to be more group dependent (possibly because they need to rely on external support). An anxiety factor may be derived from the 16PF based on Factors L, O, Q_4, C, H and Q_3. Of these, Factor H and Q_3 were significant and O nearly so, suggesting that the sylbs were more shy and apprehensive (cf. neuroticism), but also had strong control of the emotions. Thus, it is perhaps not surprising that no clear picture has emerged in respect of Eysenck's personality dimensions.

One of the key aspects of previous research has been evidence of strong relationships between sylbism and convergence, and sylfism and divergence. The personality profiles of the sylbs and sylfs given above accord quite well with the descriptions of convergers and divergers in Hudson (1966), but no significant differences were found in the present study on either the divergent thinking tests or the intelligence factor of the 16PF. It is possible that some difference may have emerged if convergers and divergers had been identified from their relative performance on the divergent thinking and intelligence tests in the manner of Hudson (1966), but it does not seem likely. The result is a surprising one and it is a matter of regret that no time was available to include a full intelligence test like the AH5 (Heim, 1968).

In the introduction we gradually moved towards a suggestion that sylbism might be a particular aspect of dogmatism. The results of the enquiry show that Rokeach's (1960) four main characteristics of dogmatism—the authoritarian outlook on life, the closed way of thinking, the intolerance of those of opposing belief and the sufferance of those of similar belief—correspond well with those associated with the sylbs. So too do the tendencies towards conformity, strong control over feelings, inflexibility, dependence on authority and a need to feel the environment is predictable. These indications are borne out by the actual scores on the Rokeach test of dogmatism. Thus, the research appears to support the hypothesis of a relationship between dogmatism and sylbism.

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APPENDIX

Items of sixth-form sylb-sylf inventory. Respondents asked to indicate agreement or disagreement. Scale scored in syllabus-bound direction ; 'sylb' answers given in parentheses.

1. I worry if I have to miss a day at school or college. (A)
2. I put off written work till the last minute. (D)
3. I tend to take fewer notes than most of my classmates. (D)
4. Whether I like a subject or not, I do my best to get a good mark. (A)
5. During free periods I usually get on with work that has been set. (A)
6. I like teachers who keep to the point. (A)
7. Interests out of school often make me neglect my work. (D)
8. I tend to be erratic, sometimes working well, sometimes badly. (D)
9. I would rather pursue my own ideas than follow a syllabus. (D)
10. I prefer teachers who stick to the syllabus. (A)
11. It is important for me to keep a good set of notes. (A)
12. I prefer straightforward tasks to those calling for initiative or originality. (A)
13. I sometimes doze or daydream in class. (D)
14. I work hard at all subjects, even at those which do not interest me. (A)
15. It is most unusual for me to hand in work late. (A)
16. I find schoolwork restricting and would like to have more freedom of choice. (D)
17. I find it difficult to concentrate on my homework. (D)
18. I try to keep to the set work and avoid following up interesting sidelines. (A)
19. I get very worried about work which is overdue. (A)
20. I prefer to be taught by the teacher, rather than be left to discover things for myself. (A)

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REPLICATIVE STUDIES IN HIERARCHICAL LEARNING OF GRAPHICAL INTERPRETATION SKILLS

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SUMMARY. Three important deficiencies of learning hierarchy validation studies—inadequate scope, inappropriate validation technique and lack of replicative data—were identified, and substantially resolved in the construction and replicate validation of a comprehensive network of graphical interpretation skills. The two parallel validation studies involved 204 grade 8 students in Queensland and 212 grade 8 students in South Australia, both groups containing approximately equal numbers of male and female students. The results in both validation studies were relatively consistent, substantiating the postulated learning hierarchy and thus providing further supportive evidence for Gagné's model of hierarchical learning.

INTRODUCTION

The model of hierarchical learning initially proposed by Gagné (1965) was based on the premise that the ability to perform any complex intellectual skill was dependent on prior mastery of relevant prerequisite or subordinate skills. One of the most important advantages of this model, apart from its direct application to many traditional areas of classroom learning, was that it led to the postulation of logically-structured learning hierarchies, which could then be subjected to empirical validation. A number of research studies on the validation of learning hierarchies, initiated by Gagné and Paradise (1961) and more recently extended by others (see Linke, 1973 ; White, 1973) have contributed toward the substantial and accumulating body of evidence in support of Gagné's model.

Many of these validation studies, however, have suffered from serious methodological deficiencies, others from limitations in the scope of definition, and in consequent application, and all have suffered from a lack of appropriate replicative data. The methodological deficiencies, recently discussed by White (1971, 1973, 1974) and Linke (1973), have included the omission of teaching facilities (Dutton and Riggs, 1969), inadequate definition of skills, and the failure to distinguish between generalised or intellectual skills and specific elements of verbalised knowledge (Kolb, 1967), and the use of inappropriate statistical techniques (see White, 1974). Although many of these deficiencies were identified, and to some extent resolved in a recent validation study by White (1971), the resultant learning hierarchy was of limited practical value, since it covered a relatively narrow range of graphical interpretation skills directed specifically toward the calculation of velocity from a two-dimensional distance/time curve. Other studies with a broader scope were limited in turn by inadequate definition of skills (Kolb, 1967), often leading to inconsistent validation results.

The present research was intended to account, in some degree at least, for each of these deficiencies—inadequate scope, inappropriate validation technique and lack of replicative data—by means of the construction, analysis, and replicate validation of a comprehensive network of graphical interpretation skills. This topic was chosen as one of general importance to many subject areas, more particularly to science and mathematics, and incorporated in a number of international curriculum programmes (see Linke, 1973).

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CONSTRUCTION AND TRIAL VALIDATION OF THE LEARNING HIERARCHY

A comprehensive learning hierarchy of graphical interpretation skills (Figure 1) was constructed by the method of task analysis proposed by Gagné and Paradise (1961). The learning hierarchy incorporated a total of 22 basic interpretative skills relating particularly to two-dimensional point and line-segment graphs, culminating in six different terminal skills. These involved the location of (1) specified co-ordinate points, (2) interpolated and extrapolated points, and (3) turning points, and the calculation of (4) displacement, (5) gradient and (6) area. These skills were defined in general or symbolic, rather than specific dimensional terms, in order to minimise the necessity for explanations of complex derived quantities such as gradient and area. Following initial construction, the postulated learning hierarchy was checked for logical consistency by a number of curriculum experts, in order to ensure some degree of subjective validity.

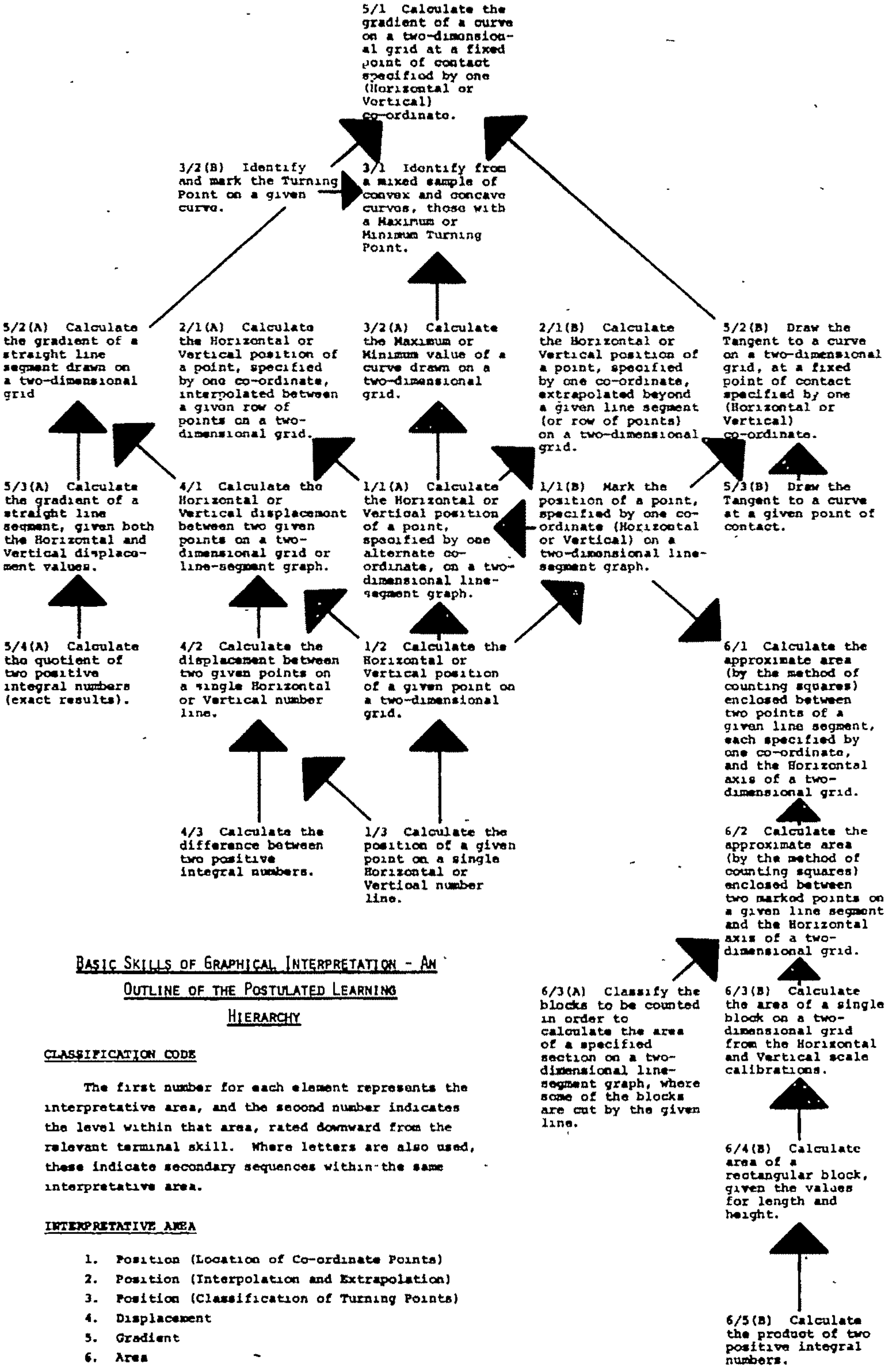
An extensive analysis was subsequently made to identify possible subdivisional skills within each of the basic interpretative abilities. For example, the ability to calculate co-ordinate position on a two-dimensional grid (element 1/1 A in the postulated learning hierarchy) was examined for possible differences arising from changes in axis orientation (horizontal or vertical), numerical range (integral or decimal) or sign (positive or negative). The analysis of subdivisional skills was intended to define more precisely the limits of lateral transfer inherent in each of the basic skills and thus to avoid invalidating likely connections through comparison of different subdivisional skills at successive levels of the learning hierarchy.

The results of this analysis were generally quite consistent and indicated no immediate transfer within the relevant interpretative skills across differences in axis orientation, numerical range or sign. Other subdivisional conditions relating to particular combinations of positive and negative numbers were also established for certain computational skills, and in accordance with these results the postulated learning hierarchy was subsequently amended so that each of the basic skills was defined within a similar range of lateral transfer (subdivisional) conditions.

A comprehensive programme of instructional and testing materials was then prepared for a trial validation study. This programme was constructed, as proposed by White (1971), so that each of the basic skills in turn was defined with appropriate instructions, illustrated with a fully-worked example, and finally examined with two analogous questions. The sequence of presentation generally followed a linear pattern, progressing from simpler to more complex skills along each strand of the learning hierarchy, with revisionary questions included at each of the branching points.

A limited validation trial was then conducted in Victoria to check on the presentation sequence of skills, to select an appropriate level for the final validation studies, and to provide information on the general applicability of instructional materials for the relevant student population. With respect to the presentation sequence of skills, no major inconsistency was revealed in the postulated learning hierarchy. Moreover, on considering the range of student reading and computational ability, and the likely influence of previous curricular experience, grade 8 (or first year high school) was eventually chosen as the most appropriate level for the major validation studies.

FIGURE 1



5/1 Calculate the gradient of a curve on a two-dimensional grid at a fixed point of contact specified by one (Horizontal or Vertical) co-ordinate.

3/2(B) Identify and mark the Turning Point on a given curve.

3/1 Identify from a mixed sample of convex and concave curves, those with a Maximum or Minimum Turning Point.

5/2(A) Calculate the gradient of a straight line segment drawn on a two-dimensional grid

2/1(A) Calculate the Horizontal or Vertical position of a point, specified by one co-ordinate, interpolated between a given row of points on a two-dimensional grid.

3/2(A) Calculate the Maximum or Minimum value of a curve drawn on a two-dimensional grid.

2/1(B) Calculate the Horizontal or Vertical position of a point, specified by one co-ordinate, extrapolated beyond a given line segment (or row of points) on a two-dimensional grid.

5/2(B) Draw the Tangent to a curve on a two-dimensional grid, at a fixed point of contact specified by one (Horizontal or Vertical) co-ordinate.

5/3(A) Calculate the gradient of a straight line segment, given both the Horizontal and Vertical displacement values.

4/1 Calculate the Horizontal or Vertical displacement between two given points on a two-dimensional grid or line-segment graph.

1/1(A) Calculate the Horizontal or Vertical position of a point, specified by one alternate co-ordinate, on a two-dimensional line-segment graph.

1/1(B) Mark the position of a point, specified by one co-ordinate (Horizontal or Vertical) on a two-dimensional line-segment graph.

5/3(B) Draw the Tangent to a curve at a given point of contact.

5/4(A) Calculate the quotient of two positive integral numbers (exact results).

4/2 Calculate the displacement between two given points on a single Horizontal or Vertical number line.

1/2 Calculate the Horizontal or Vertical position of a given point on a two-dimensional grid.

6/1 Calculate the approximate area (by the method of counting squares) enclosed between two points of a given line segment, each specified by one co-ordinate, and the Horizontal axis of a two-dimensional grid.

4/3 Calculate the difference between two positive integral numbers.

1/3 Calculate the position of a given point on a single Horizontal or Vertical number line.

6/2 Calculate the approximate area (by the method of counting squares) enclosed between two marked points on a given line segment and the Horizontal axis of a two-dimensional grid.

6/3(A) Classify the blocks to be counted in order to calculate the area of a specified section on a two-dimensional line-segment graph, where some of the blocks are cut by the given line.

6/3(B) Calculate the area of a single block on a two-dimensional grid from the Horizontal and Vertical scale calibrations.

6/4(B) Calculate area of a rectangular block, given the values for length and height.

6/5(B) Calculate the product of two positive integral numbers.

BASIC SKILLS OF GRAPHICAL INTERPRETATION - AN OUTLINE OF THE POSTULATED LEARNING HIERARCHY

CLASSIFICATION CODE

The first number for each element represents the interpretative area, and the second number indicates the level within that area, rated downward from the relevant terminal skill. Where letters are also used, these indicate secondary sequences within the same interpretative area.

INTERPRETATIVE AREA

1. Position (Location of Co-ordinate Points)
2. Position (Interpolation and Extrapolation)
3. Position (Classification of Turning Points)
4. Displacement
5. Gradient
6. Area

ADMINISTRATION OF THE MAJOR VALIDATION STUDIES

The major validation study in Queensland involved a total of 204 first-year students from six randomly selected metropolitan high schools in Brisbane. This group contained approximately equal numbers of male and female students, ranging in age from 12 to 14 years (taken to the nearest year) with a mean of 13·1. The South Australian study involved a total of 212 first-year students from six high schools in Adelaide. This group also contained approximately equal numbers of male and female students, ranging in age from 12 to 15 years with a mean of 13·2.

The administrative conditions were similar for both of these validation studies. The programme of instructional and testing materials was divided into three convenient sections, each dealing with a different set of interpretative skills. These sections were presented consecutively, and since no time limit was imposed short breaks were given at regular intervals through the testing period. No significant difference was observed in the range of completion times (approximately 40-80 minutes) between the various classes in Queensland and those in South Australia.

RESULTS

The results for each pair of hierarchically related skills were arranged in a 3×3 contingency table (Fig. 2), with the number of questions correct for each individual skill represented by the appropriate marginal totals. Thus, the number of exceptions observed for each of the postulated hierarchical connections, that is the number of students with neither question correct for the lower skill and both correct for the higher skill, was indicated in the bottom right-hand (0/2) cell. This number was then compared with an expected maximum or critical number, calculated from the various marginal totals according to the method proposed by White and Clark (1973), and if the actual number of exceptions observed was greater than that expected, then the postulated connection was rejected as invalid under the relevant null hypothesis.

FIGURE 2

Contingency Table Format Used for Validation Results.

Questions Correct		HIGHER SKILL 5/2 (A)			
		0	1	2	Total
	2	61	13	77	151
LOWER SKILL (4/1)	1	10	4	9	23
	0	23	5	2	30
Total		94	22	88	204

Number of Students

Number of Exceptions = 2

(Results derived from the major validation study in Queensland for the postulated hierarchical connection between elements 4/1 and 5/2 A.)

This procedure for the analysis of individual hierarchical connections followed basically the method proposed by White (1971), although certain modifications were made to the statistical validation technique. For example, the null hypothesis used by White was that no exceptions should be allowed other than those arising through errors of measurement, yet this ignored the possibility of legitimate exceptions arising through the use of unidentified prerequisite skills or alternative learning pathways. The calculation of linear displacement, for example (element 4/2 in the learning hierarchy), was postulated in this case to be dependent on the skills of subtraction (element 4/3) and point location (element 1/3), but could also be achieved without these skills by counting the number of marked divisions from one point to the other. Although this would seem a tedious and unlikely procedure, nevertheless under the absolute criterion of dependence adopted by White its very existence could invalidate the postulated learning pathway.

In accordance with this argument for a more realistic validation test, and consistent with Gagné's (1970) recent orientation toward substantial rather than absolute levels of hierarchical dependence, the null hypothesis was tested at three different levels of stringency. These included an absolute level (designated 00) as previously defined by White (1971), and two additional levels (01 and 02) which allowed respectively for 1 and 2 per cent of those possessing the higher skill to lack the postulated prerequisite, and thus to have used alternative or unspecified subordinate skills. The power in each case was calculated against the same alternative hypothesis, which in turn was defined to allow a much higher level of exceptions (10 per cent), thus indicating no substantial relationship of hierarchical dependence.

TABLE 1

AN OUTLINE OF VALIDATION RESULTS.

		QUEENSLAND			SOUTH AUSTRALIA		
Lower Skill	Higher Skill	No. of Exceptions		Power	No. of Exceptions		Power
		Observed	Expected*		Observed	Expected*	
1/3	1/2	1	1/00	1·00	1	1/00	1·00
1/2	1/1 B	9	9/00	0·96	14	11/02	—
1/1 B	1/1 A	0	7/00	0·99	0	7/00	0·99
1/2	1/1 A	7	9/01	0·92	11	10/02	—
1/1 A	2/1 A	17	16/02	—	19	14/02	—
1/1 A	2/1 B	11	11/00	0·76	12	12/00	0·59
1/1 A	3/2 A	0	7/00	0·94	4	10/00	0·72
3/2 A	3/1	2	15/00	0·07	12	16/00	0·16
3/2 B	3/1	0	6/00	0·44	0	5/00	0·76
4/3	4/2	0	2/00	1·00	2	8/01	0·99
1/3	4/2	0	2/00	1·00	0	1/00	1·00
4/2	4/1	1	7/00	0·97	3	4/00	1·00
1/2	4/1	10	11/00	0·90	6	9/01	0·95
5/4 A	5/3 A	7	8/01	0·99	0	3/00	1·00
5/3 A	5/2 A	2	3/00	0·98	0	2/00	0·95
4/1	5/2 A	2	5/00	0·91	2	5/00	0·67
5/3 B	5/2 B	0	8/00	0·93	3	7/00	0·95
1/1 B	5/2 B	1	3/00	1·00	1	5/00	0·98
5/2 B	5/1	3	9/00	0·02	0	5/00	0·04
5/2 A	5/1	1	10/00	0·02	3	7/00	0·02
6/5 B	6/4 B	1	3/00	1·00	0	3/00	1·00
6/4 B	6/3 B	2	3/00	1·00	2	3/00	1·00
6/3 B	6/2	0	8/00	0·54	1	7/00	0·51
6/3 A	6/2	0	9/00	0·57	0	9/00	0·31
6/2	6/1	4	11/00	0·27	2	10/00	0·08
1/1 B	6/1	1	2/00	0·96	0	2/00	0·78

* The second number in this column indicates the appropriate null hypothesis.

The overall level of significance for each of the major validation studies was arbitrarily set at 0·05, so that the individual probability of a Type I error (false rejection of the null hypothesis) for each of the 61 tests (including parallel connections for different subdivisional conditions) was determined by $\alpha = 1 - \sqrt[61]{1 - 0{\cdot}05} \simeq 0{\cdot}001$ (Linke, 1973).

A summary of results for both of the major validation studies is presented in Table 1. These results indicate the number of 0/2 cell exceptions observed for each of the postulated hierarchical connections, the maximum or critical number expected from the marginal totals of the relevant contingency table, together with the appropriate null hypothesis (00, 01 or 02), and for each of the valid connections the statistical power of the test. Certain of the postulated connections were tested in several parallel forms, corresponding to different subdivisional groups within the relevant skills, but since these results were generally quite consistent, only one of the parallel forms has been presented in this table.

DISCUSSION

Apart from certain inconsistencies associated with positional skills (area 1), the results for both of these validation studies were generally quite consistent. Almost all of the postulated connections were accepted as valid at one of the null hypothesis levels, and most of these at the absolute (00) level. These results have served to establish the validity, through two independent replicative studies, of a comprehensive learning hierarchy of graphical interpretation skills, and thus to substantiate the model of hierarchical learning (Gagné, 1965) from which the postulated sequence of skills was initially derived. Before discussing the significance of this result, however, it may be useful to explain a few points of methodological importance.

The four inconsistent hierarchical connections, which occurred between skills 1/2 and 1/1A, 1/2 and 1/1B, and between 1/1A and 2/1A, were each rejected as invalid at the weakest (02) null hypothesis level in one or both of the validation studies. These inconsistencies appeared to occur through incidental acquisition of two positional skills (1/2 and 1/1A) in the course of subsequent attempts at more complex capabilities, and this was confirmed by an analysis of test/retest results for the two anomalous skills. The problem was probably caused by repetition of certain instructional procedures for each of the relevant superordinate skills, which effectively provided an additional opportunity to learn the postulated prerequisites. Whether or not these results should be classified as legitimate exceptions to the postulated learning hierarchy is an arguable point. It is possible, for example, as suggested by White (1971), that the relevant subordinate skills might still have been acquired first within the context of the higher skill, then immediately used to solve the more complex questions. Thus, any students succeeding at the higher skill, and subsequently found to have acquired incidentally the postulated subordinate skills, could be eliminated from the relevant validation test for want of definitive information on which of the skills was actually first acquired (White, 1971). It could also be argued, however, that any skill acquired incidentally should not be classified as an independent prerequisite ability, and this leads in turn to an unresolved argument of basic definition. It suffices to conclude for this study, however, that the validation test was conservative in accounting for all exceptions to the postulated hierarchy.

Another potential source of inconsistent results was caused by inadequate formation of the alternative hypothesis in the test of hierarchical dependence (White and Clark, 1973), which occasionally produced misleading values of power. In some of the postulated connections, for example, the total number of students who failed the subordinate skill was lower than the calculated critical number of 0/2 cell exceptions, so that the relevant connection could not possibly be rejected. In cases such as this the statistical power, or probability of detecting a genuinely invalid connection, should have been extremely low, but since the alternative hypothesis took no account of subordinate skill difficulty levels, the resultant levels of power were unrealistically high.

Although insensitive to subordinate skill difficulty levels, the alternative hypothesis (modified from the original form proposed by White and Clark) was in this case related to the number of students who succeeded at the higher skill. Thus, in cases where difficult skills were involved, for example elements 5/1 and 6/1, the actual difference between null and alternative hypothesis levels was relatively small, and this in turn reduced, as expected, the level of statistical power. Unfortunately, this situation was often complicated by an increase in the overall degree of response inconsistency, caused through guessing and chance mistakes, which increased the critical number of 0/2 cell exceptions, and hence the probability of accepting the relevant connection, but also reduced substantially the power of the test. There is some consolation in these results, however, that the observed number of exceptions was generally much lower than that expected, and that the results for both validation studies, and indeed all parallel tests for different subdivisional skills, were invariably consistent.

Apart from these extensions of basic methodology, the present research has also provided for two other important deficiencies—inadequate scope and lack of replicative data—inherent in the earlier studies. In terms of scope this study has covered a comprehensive range of interpretative skills for both number-line systems and two-dimensional point and line-segment graphs. Although other graphical forms have been covered in previous validation studies (Dutton and Riggs, 1969), these forms are probably not as frequently used as point and line-segment graphs. Constructional skills were also excluded from this research (apart from element 1/1B) but these again are probably used less frequently than those of interpretation.

Although a common validation result might well have been anticipated for these two groups of students from their general similarity in cultural background, there were, nevertheless, certain differences in formal curricular background, since a different course of study had been used in each state for primary school science and mathematics, with a different range and sequence of particular concepts and skills, and this could have led to differences in ability to acquire the new, but related, material contained in the validation programme. But, in spite of expectations, it had yet to be established from previous research studies that a learning hierarchy validated for one group of students would also hold for another, different, group. In this sense, therefore, these replicative studies have provided an important test of both model and methodology, with positive and relatively consistent results to extend the scope of supportive evidence for Gagné's model of hierarchical learning.

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IMAGERY INSTRUCTIONS AND THE COMPREHENSION OF TEXT

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Summary. 119 fifth- and sixth-grade children read a 20-paragraph text, with half of the groups receiving a test immediately after reading. One week after learning, all children were given a delayed test. The tests measured both verbatim and semantic recall of questions seen during the initial reading. Half of the children received instructions to form mental pictures of the text events during learning. The remaining half of each group were merely told to read carefully. Control groups read only text or only text-related questions. Analysis of the pooled delay scores showed a decided superiority for learners receiving imagery instructions. The instructed children also recalled more semantic than verbatim test items. These data indicate that using image instructions with text material increases the amount of content remembered over time.

INTRODUCTION

Telling a subject to form mental pictures as he learns yields dramatic gains in the recall of noun pairs and words in sentences (Paivio, 1971 ; Rohwer and Ammons, 1971). Surprisingly, there is little research which has asked if imagery instructions provide the same powerful facilitation with prose materials of the type found in textbooks.

In one of the few studies done, Anderson and Kulhavy (1972) reported that high school students who received imagery instructions before studying a text recalled no more 'factual' content than did a non-instructed control group. However, a questionnaire given after the study indicated that subjects who said they actually used images learned more than non-image learners. One possible explanation for these results is that more experienced learners (high school students) tend to have developed their own idiosyncratic procedures for remembering complex material (Kulhavy, 1970 ; Montague, 1972). If this is the case, then supplying older students with a strategy not commonly used should lead to little improvement. This line of reasoning explains the Anderson and Kulhavy (1972) data, which show increased learning only when a student actually uses the strategy being assessed.

If our assumptions concerning the use of imagery are correct, then a clear test of its effect on text learning can only be made by employing a younger subject population who lack well-practised, entrenched learning strategies (e.g., Jensen and Rohwer, 1965). With younger students imagery instructions should boost learning simply because the child's *ad lib* study strategies are replaced with a more effective procedure.

A second contention of this study is that image instructions work to increase semantic recall of what is learned. Here, we agree with Paivio (1971) that forming images facilitates recall by furnishing the learner with a meaningful representation of the material being studied. Whether this representation takes the form of a 'thema,' or merely establishes larger context relations, is not clear. However, previous work suggests that imaging should serve to increase the degree to which learners remember the *meaning* of text as well as its rote, verbatim components (Anderson and Hidde, 1971). In this study, subjects were tested for recall using both verbatim and semantic (lexical paraphrase) items. Since paraphrase items require semantic comprehension, image-instructed learners were expected to remember more meaning-based items than their non-instructed counterparts.

Finally, we gathered data on long-term retention. Here, there is good evidence that over time people tend to recall the meaning of text rather than its verbatim form (Sachs, 1967). Consequently, if images induce the student to learn semantic properties, then one would predict such effects to become more pronounced over time.

METHOD

Design and Subjects.

Two factors, image-instructions (i) and position of first test (t) were combined to produce four experimental groups. Verbatim-paraphrase item types (vp) were treated as a repeated measures variable for each factorial cell. The design was thus a 2 i (image *versus* no image instructions) by 2 t (immediate *versus* delay test) by 2 vp (verbatim *versus* paraphrase item types) mixed analysis of variance with repeated measures on the vp factor. Two control groups completed the design. The first (c_1) read only text without questions, and the second (c_2) saw only questions without text.

The subjects were 128 fifth- and sixth-grade children from the Osborn School District in Phoenix, Arizona. There was no evidence that these learners were not representative of the general school population in the school sampled. Nine of the children were dropped from the data analysis for failure to complete all of the experimental tasks.

Materials.

The experimental text was written by the authors and consisted of a 20-paragraph prose passage titled " The Island of Ako and Its People." The text described the life and culture of a fictitious people living on a remote Pacific Island. For each of the 20 paragraphs, two questions were constructed. Each set of questions were lexical paraphrases of one another, similar in meaning, but containing no substantive words in common other than articles and the terminal response. Examples of the questions for one paragraph are :

The islanders construct their clothes from .... (*palm leaves*).

Garments worn by the natives are made with .... (*palm leaves*).

Since making an overt response helps to guarantee that the material will be read (Kulhavy and Parsons, 1972), the learners were required to fill in the terminal blank for each item encountered in the text.

Normative information on both the paragraphs and their questions were obtained on two occasions. On the first, 34 fifth and sixth graders from the participating district were instructed to rate each pair of questions on their degree of similarity in meaning, using a five-point scale with 5 indicating highest similarity. The first group also read the paragraphs and indicated any words which they had difficulty understanding. Based on these initial data, both the questions and the paragraphs were modified and tested again on another 36 students from the same population. The final materials used in the study consisted of 20 paragraphs, averaging 58 words in length, and 20 sets of corresponding questions with a median similarity rating of 4·22. Finally, as far as possible it was assured that all nouns in both the paragraphs and questions possessed a concrete environmental referrent.

The experimental booklets consisted of 20 pages, each page containing a paragraph and its corresponding question. Which of the two possible questions was selected for a given paragraph was randomly determined across each booklet. Hence, which specific questions constituted the verbatim-paraphrase dimension was separately determined for each learner. In the booklets for the image-instructed subjects, the words " Form a mental picture of these events before turning the page " was typed at the bottom of each page.

The criterion test consisted of all 40 verbatim and paraphrase questions. The test was administered in two forms, with the pairs of questions split between alternate forms. As in the text, each test item required the learner to construct the correct terminal response.

Procedure.

The study was conducted in a large classroom at the participating school, and all subjects participated together in one session. The experimental booklets were randomly distributed with the restriction that about the same number of subjects be represented in each experimental group. Control group booklets were handed out at a lower ratio to conserve the size of the experimental groups. The first page of each booklet contained instructions appropriate to the learner's condition. Image-instructed subjects were told to form mental pictures of the events and activities in each paragraph prior to constructing their response to the question. Non-instructed subjects were merely told to read the material and answer each of the questions correctly.

At the beginning of the session, the experimenter read a set of standard instructions and answered any questions concerning the general nature of the task required. When it was assured that the procedures were fully understood the learners were told to open their booklets and begin working. As soon as each subject completed the booklet, his materials were collected and his study time recorded to the nearest 10 seconds. The subject then received either the first form of the test (immediate group) or an unrelated placebo test (delay group). Learners in the immediate group were given the second form of the test as soon as the first was completed. Which form of the test was received first by subjects in the immediate group was randomly determined. The subjects were not informed of the second testing.

Exactly one week following the first session, all subjects again met in the classroom and received both forms of the test. The order of forms was again randomised for the second session. Those subjects in the control groups were given the test at both the immediate and delay sessions.

RESULTS

The first analysis done was an image-instruction × immediate-delay test × verbatim-paraphrase item analysis of variance using scores on the first test received as the dependent measure. This analysis yielded significance only for the immediate-delay test factor ($F=37{\cdot}76$, $df=1$ and 94, $P<{\cdot}01$). Image-instructed learners performed somewhat better on the first test, but the difference was not significant at conventional levels ($F=3{\cdot}56$, $df=1$ and 94, ${\cdot}10>P>{\cdot}05$).

Table 1 shows the means and standard deviations for delay scores only.

TABLE 1

MEANS AND STANDARD DEVIATIONS FOR SCORES ON THE DELAYED TEST.

Test		Instructions				
		No Image			Image	
		Verbatim	Paraphrase		Verbatim	Paraphrase
Received Immediate Test	M........	11·06	10·89		12·95	14·23
	SD	3·52	3·79		2·98	4·09
	N=23....			N=24		
Did Not Receive Immediate Test	M........	8·94	8·04		8·01	10·93
	SD	3·44	4·52		3·70	2·62
	N=25....			N=26		

It was necessary to perform a separate analysis on the delay data because half of the subjects had received no immediate test. An image-instruction × presence or absence of an immediate test × verbatim-paraphrase item analysis of variance on the delay scores gave significance for the image-instruction (F=5·60, df=1 and 94, P<·05) and immediate test (f=18·96, df=1 and 94, P<·01) main effects and the image-instructions × verbatim-paraphrase interaction (F=5·00, df=1 and 94, P<·05).

Last done was a one-way analysis of variance on reading times between the experimental groups. The results of this analysis were not significant.

Finally, the scores of the two control groups were satisfactorily below those of the learners in the experimental groups. The means and standard deviations for the control conditions are presented in Table 2.

TABLE 2

TEST SCORE MEANS AND STANDARD DEVIATIONS FOR CONTROL GROUPS ON BOTH IMMEDIATE AND DELAY MEASURES.

Test		Condition	
		Read Only Text	Read Only Questions
Immediate Test	M................	15·32	·91
	SD	8·39	·53
Delay Test	M................	11·17	1·04
	SD	9·02	·62
	N=	11	10

DISCUSSION

The important finding of this study is that grade school students remember more from a text if they try to form mental images while reading. The performance differences were less pronounced between immediate and delay measures ; however, the pooled delay scores showed a decided superiority for the instructed learners. Clearly, the retention effects were not due to the presence of the immediate test (e.g., Kulhavy and Anderson, 1972) since this factor failed to interact with other variables in the analysis. Hence, we are able to conclude that image-instructions act to increase the amount of text-content available over time. These results are in line with the original prediction that images work primarily to increase retention.

The form of the image-instructions × verbatim-paraphrase interaction is difficult to interpret. This effect was essentially due to the better recall of paraphrase times by the image-instructed group. It was initially contended that instructions should increase semantic recall relative to a non-instructed condition ; however, there appears to be no obvious reason why a subject should remember items he has not seen better than items to which he has actually responded, in spite of the high degree of lexical equivalency between the two sets. Perhaps some spurious factor (e.g., inter-item interference) works to depress the overall recall of verbatim statements. Unfortunately, these data do not provide the information necessary to assess such possibilities.

The implications of these results for school learning are obvious, at least with younger students. If one can supply learners with an efficient memory strategy, it is likely that more will be remembered from the study of text. It seems probable that such procedures may furnish the teacher with yet another tool for facilitating the learning of text-based materials.

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PRESENTATION VARIABLES AND STUDENTS' ACTIVITIES IN MEANINGFUL LEARNING

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SUMMARY. Two experiments were conducted in which first-year students were asked to read a passage of prose under different conditions, chosen to represent realistic study strategies. In the first experiment 86 students were allocated to three main conditions of reading, copying and summarising. The summarising activity, contrary to expectations, did not lead to greater recall than reading alone. The results of the second experiment, in which some of the 96 students read the material and others listened to it, indicated that the requirement to undertake recording activities has a negative effect upon learning only in circumstances whereby such a requirement imposes constraints upon learners' strategies.

INTRODUCTION

SINCE Rousseau developed the view that the active involvement of the individual is a crucial element in learning, there has been no shortage of educators anxious to stress the importance of the strategies and actions undertaken by individual students. Writers such as James (1920), Dewey (1913) and more recently, Bruner (1960) have been among the most eloquent in supporting this position and in exploring its implications for everyday educational practice. Direct empirical evidence concerning the effects of learners' strategies was supplied in a number of investigations by Bartlett (1932) and his students, and by research in the United States such as Allport and Postman's (1947) study of rumours. Modern experimental investigations have supplied added precision, and have demonstrated the outcomes of various kinds of procedures and strategies undertaken by individual learners. There now exists a bulky mass of evidence concerning the importance of, for instance, organisational factors (reviewed by Bower, 1970 ; Howe, 1970a) ; various kinds of mediational strategies in the learning of verbal materials (reviewed by Jensen, 1971) ; learners' activities involved in producing and reproducing information made available in prose form (e.g., Howe, 1972a) and strategies used by students in higher education (Howe, 1974). The varying forms of research have jointly contributed abundant evidence for the important contribution to learning of a number of active procedures that learners undertake in dealing with incoming information in order to acquire knowledge.

These findings appear to have strong implications for educational practice. However, prior to drawing any firm conclusions concerning their applicability to school learning in practical settings, it is necessary to take into account a number of additional considerations that have received little or no attention in the experimental research. These have to do with what Campbell and Stanley (1963) term the *external validity* of research, and concern the extent to which scientific findings can be generalised to settings that differ in details from those in which the original results were obtained. In this instance we are concerned with the applicability of data obtained from laboratory studies of learning to ' real life ' educational circumstances.

A first consideration is that of time. As often as not the important problem in educational practice is not to discover which of a number of methods or procedures designed to promote effective learning is most effective when time is unlimited, but to find which one works best, given that a fixed amount of time is available. Secondly, one has to be concerned with the media by which information is made available. In the present context, for instance, a number of results that have demonstrated the influence of learner strategies on the acquisition of knowledge were obtained in situations where information was presented by ear. One cannot automatically assume that similar findings will result when information is acquired through reading. A third consideration is that of the precise nature of materials being learned. In experimental research it is customary to use materials for learning that are in some respects artificial, and often simpler than the kinds of content typically encountered in educational settings. The reasons for this are perfectly justifiable, and relate to the necessity for exerting precise control over experimental conditions. Nevertheless, the use of artificial, simplified learning materials does give rise to problems in applying results. One can never be sure, for instance, that a student strategy which effectively facilitates the learning of a simple list of words has any value for the acquisition of knowledge that is communicated in highly complex and structured forms, as is the case with much educational content.

One way to solve some of the problems raised by these three considerations is to undertake experimental research in which the conditions for learning and the content of the materials to be learned approximate fairly closely to those encountered in everyday education. The present investigation provides experiments of this kind. They attempt to measure the effects of procedures suggested by the findings of experimental research which we have previously undertaken into the outcomes of learners' individual activities. In the following experiment the above considerations are taken into account in an attempt to explore the practical implications of findings that have reliably occurred in a number of experiments on learning (Bartlett, 1932 ; Kay, 1955 ; Howe, 1970b, 1972b). In summary, these studies have shown that the knowledge acquired by individuals through learning is much more likely to contain items they have themselves produced or reproduced on a previous occasion than items to which they have simply been exposed, albeit on several separate occasions. Thus, Howe (1970b), in an experiment in which students were asked to listen to a prose passage on a number of occasions, and made repeated recall attempts, found that items presented to an individual on only one occasion but correctly recalled in a subsequent test were more than three times more likely to be correctly recalled again on a subsequent test, one week later, than items presented on three occasions but not previously recalled. In general, subjects were extremely good at remembering materials which they had previously been able to reproduce correctly, and also at remembering items which they had produced as incorrect ' additions ' in their previous attempts to recall prose passages to which they had listened. Furthermore, in another experiment (Howe, Ormond and Singer, 1974) whereby subjects listened to a prose passage and received varying instructions concerning the strategies they should adopt, individuals who were required to record the passage as they heard it subsequently showed greater improvement in accuracy of recall than individuals who either merely listened to the passage or who engaged in an activity (writing only words containing the letter ' s ') that did not necessitate their recording the passage.

The present experiment investigates the applicability of these findings under more realistic learning conditions. Some students were simply asked to read a descriptive prose passage. Other students were required to copy the passage, while a third group produced summaries as they were reading. These experimental conditions were designed to test the efficacy of active involvement in the process of learning, such as is found in note-taking. With note-taking it appears that one or both of two kinds of process are likely to be involved. First, the learner is having to be active (to actually write the notes) and attentive (to be able to record the information). Secondly, he may additionally involve himself in some processing and coding activities. The experimental conditions were chosen to be summarising and copying (rather than the more realistic condition of note-taking) because these activities can be more clearly defined and controlled. The copying condition was designed to involve the student in some of the activities involved in note-taking and summarising, namely, the activity and the attention, but not in others, namely the active processing and coding activities.

It was predicted that students would learn more effectively to the extent in which they were actively involved in the learning process. As the summarising condition focused attention and demanded cognitive processing, the highest score on a subsequent recall test was predicted for this condition.

In a pilot study the length of time necessary for the three experimental conditions was carefully examined. People varied in the time taken in copying and making summaries, but it was found possible to choose a time value which would allow the vast majority of students to complete their task.

EXPERIMENT ONE

METHOD

The subjects.

Eighty-six first-year undergraduate students attending a course in Human Development participated as subjects. They attended as a group on each of two successive weekly sessions.

The materials to be learned.

It was necessary to select a prose passage which resembled in level of difficulty and degree of abstraction the kind of educational content to which the students are customarily exposed, but which was relatively unfamiliar to the subjects, so that prior differences in familiarity with the content would be minimal. Furthermore, in order for it to be possible to measure the accuracy with which subjects succeeded in reproducing the meaningful content, it was necessary to use a passage containing a number of relatively discrete facts and items of information. The chosen prose passage, which was considered to meet these criteria, was a 286-word extract from a *New Scientist* article concerning the use of cloud seeding procedures in attempts to control the weather. The findings of a pilot study indicated that the contents of the passage were unfamiliar to the vast majority of students comparable to those in the present sample, and that the technical content was not sufficient to hinder comprehension.

Procedure.

There were two sessions, separated by an interval of one week. On the first session, each subject was handed a booklet containing some of the experimental instructions, together with the prose passage. The three main experimental groups received different instructions, as follows. Group One (N=27) were told to spend 10 minutes reading the extract at their own pace, rereading it if time was available. Group Two (N=25) were told to use the 10 minutes for copying the passage, so far as possible word for word. The instructions to subjects in Group Three (N=25) were to make a summary of each paragraph in the prose passage. All subjects were warned that they might subsequently be asked questions about the subject matter. After 10 minutes the booklets were collected and the test for recall of the content was administerered. Subjects were told to attempt to reproduce the passage they had been given. They were to use the words and form of the original extract where possible, but they were asked to concentrate on reproducing as accurately as possible the meaningful content. A period of 10 minutes was allowed for this attempt at recall of the prose passage. One week later a further test for subjects' retention of the passage contents was administered. Again, subjects were asked to reproduce the passage as accurately as possible, and, once more, a period of 10 minutes was allowed. Thus, there were two criteria for learning, first the level of performance in the immediate recall test, and secondly, the scores in the test for long-term retention that was administered after an interval of one week.

There was a fourth experimental group, introduced in order to ascertain the effect, if any, of the immediate recall attempt on performance in the test given after one week. The nine subjects who formed this group were not asked to attempt immediate recall, and attempted only the test given one week later. These subjects' instructions were otherwise identical to those of Group One, in that they were told to read the passage at their own preferred rate, and they were not instructed to summarise it or to copy it. Comparison of performance by Groups One and Four at the long-term retention test thus provides a measure of the extent to which long-term retention among subjects in Group One was influenced by the prior administration of an immediate recall test. In the absence of similar comparison groups for Groups Two and Three it is not possible to state definitely what the effects of immediate recall on long-term retention would be for these groups, but the data from the comparison between Groups One and Four would appear to provide a reasonably accurate guide to the magnitude of any such effects.

Scoring procedures.

In general, the procedures for scoring the accuracy with which meaningful knowledge was reproduced followed those devised for previous studies on human learning and retention (Howe, 1970b). For purposes of scoring, the passage was divided into 25 segments, approximately equal in length. Each of these was judged to contain a fact or item of information pertinent to the meaningful content of the article as a whole. The authors decided on the minimum acceptable content that was to be required for the segment to be judged as correctly recalled in recall attempts, and written guidelines for scoring were prepared in order to ensure that the reliability and objectivity of scoring was as high as possible. Each recall attempt was scored segment by segment, out of a possible total of 25. To obtain a measure of the reliability of the scoring procedure, 15 of the scripts were rescored three weeks after the original marks had been allocated. A product-moment correlation of +·98 indicates that a gratifyingly high level of reliability was achieved.

RESULTS

In the immediate test for retention of the meaningful content of the prose passage the mean number of segments correctly recalled by Group One (read only) was 16·33 (out of 25) (N=27, sd=3·5). For Group Two (record by copying) the mean score was 10·32 (N=25, sd=3·5), and for Group Three, who were instructed to produce summaries, the mean score was 13·36 (N=25, sd=4·5). Analysis of variance showed the overall condition effect to be statistically significant, F (2/74)=14·11, P<·01. There were significant differences between Groups One (reading) and Three (summaries), F (1/74=6·87 P<·02, and between Group Three and Group Two (copying), F (1/74=6·93, P<·02. In summary, the subjects who were simply instructed to read the material performed significantly better on the immediate test than the other groups, and there was also a significant difference between the summarising and the copying groups, the latter performing worse than either of the others.

On the long-term retention test, administered to assess how much of the content learned on the first session was still retained one week later, subjects in Group One (reading only) correctly produced an average of 10·35 segments out of 25 (N=23, sd=4·3). The mean score for Group Two (copying) was 6·64 (sd=3·6, N=24) and Group Three (summaries) scored 9·23 on average (N=22, sd=4·0). The reason for the slightly lower numbers on the second session was that a small number of the individuals who participated in the immediate recall test did not attend the later session. The mean score for subjects in Group Four, which was introduced as a check on the influence of the immediate test on the long-term test scores, was 8·70 (N=9, sd=3·3). This figure does not differ significantly from the long-term retention test scores for the appropriate comparison subjects, that is Group One, F (1/30)=·83, n.s. Of course, the absence of a significant difference in the long-term retention scores between subjects who were not tested previously provides no definite evidence that the immediate test had no effect upon subsequent performance, either in the reading group or in the other experimental groups. However, it does suggest that if there was such an effect it was likely to be relatively small, and that the long-term retention scores obtained in the present experiment are broadly similar to those which would have been observed had there been no previous test.

Examination of the summaries and copies made by individual students revealed the fact that a small number of students did not quite complete their copying or summarising tasks. It is thus conceivable that some subjects did not attend to the final sentences, and if this had been the case it might have contributed to the difference in performance observed between experimental groups. Such a possibility would not invalidate the results, but it would render them somewhat trivial. In fact, however, a comparison between the recall scores obtained by those individuals in Groups Two and Three who had and who had not finished the copying and summarising tasks, indicated no difference between them, and thus the suggestion that this factor could have influenced the results receives no empirical support.

DISCUSSION

The above results are clearly not in accord with the expectation, which appeared to be based upon reliably occurring previous experimental findings, that subjects who were told to engage in the processing activities required for producing summaries would perform best in both of the immediate and long-term retention tests that provided the criteria for learning in the present experiment. On the contrary, the performance of the subjects who were simply instructed to read the materials was clearly superior on the immediate test, and on the long-term test the findings again favoured the reading group over the others, although the difference between reading and summarising groups was not statistically significant. The fact that students who were instructed to record the passage by copying it performed worse than the reading group was also out of line of expectations. The only main finding which did follow the prediction was that subjects in the groups making summaries learned more than those students who copied the materials. This was observed in the results of both the immediate and the long-term tests, the appropriate difference being statistically significant in each case.

Hindsight suggests various explanations for the discrepancies between expectations and the actual findings. Perhaps the most plausible is that subjects in the reading group performed best because their condition allowed individuals the maximum freedom to bring into play whatever strategies, procedures and individual habits they found valuable to use in coping with the task at hand. In the case of relatively sophisticated learners such as the students who participated in the present experiment, it may well be that their existing repertoire of intellectual skills is such that the individual learner is likely to be able to form strategies autonomously that are at least as successful as any particular procedure that an experimenter, or, in field settings, a teacher, instructs them to adopt. A suggestion such as this, bearing in mind with the fact that the constraints in Conditions Two and Three made it difficult for subjects to divide their attention selectively and concentrate upon parts of the material they considered to be important, whereas subjects in Group One had no such constraints, makes the obtained results begin to appear predictable. Nevertheless, it is necessary to emphasise that the obtained pattern of findings did differ very considerably from what had been confidently predicted on the basis of findings obtained from learning tasks in experimental circumstances that were similar in many respects to the present ones. The existence of such a discrepancy does at least serve to provide evidence for the need for caution in generalising findings.

One of the most striking discrepancies is that between the present findings and the result of the experiment by Howe, Ormond and Singer (1974), in which individuals who undertook recording activities as they listened to a prose passage learned more than subjects who did not copy the passage. It seems likely that this difference in findings is closely related to the one major difference between the experiments, namely, the fact that in the present experiment subjects read the passage, whereas in the earlier experiment they listened to it. A suggestion is that with written presentation there is considerable scope for the individual who is not given any specific instructions regarding recording activities, to decide how to divide his time between various parts of the passage, rereading any parts he wants to, and skimming through items which he regards as easy or unimportant. Instructions to copy or otherwise record the passage would tend to diminish this freedom of action. The individual who listens, however, has no such freedom to decide how to allocate his time and, therefore, in this case instructions to record would not be expected to have the negative effects encountered in reading situations.

In general, what emerges most clearly from the present findings is the impossibility of making any generalisation about the effects of having subjects undertake varying kinds of activities as they encounter meaningful prose materials, unless one also takes into account the manner in which the material is made available. A learner activity that may be very effective for a student who is listening to information may not be at all valuable for a subject who is exposed to identical information through reading it, and *vice versa*. Furthermore, the effects of differing activities may well depend upon the values of additional independent variables, such as rate of presentation.

In further research it is, therefore, necessary to provide experimental designs in which both presentation conditions and subject activities are manipulated as experimental variables. It then becomes possible to ascertain how the different combinations of these two variables influence performance. Experiment Two was designed with this consideration in mind. Subjects encountered the prose passage that was used in Experiment One. However, in Experiment Two some subjects read the passage, some listened to it at dictation speed, and others listened to repeated auditory presentations at a normal speaking rate. Within each of these three groups of subjects some individuals were required to record the passage by copying it in writing, and others made no overt response. The basic reason for undertaking the experiment was to ascertain what differences would emerge in learning between the six different combinations of presentation condition and subject activity.

EXPERIMENT TWO

METHOD

The Subjects.

Ninety-six first-year undergraduate students participated. These were drawn from the university subject pool, and individuals who had taken part in Experiment One were excluded. Subjects were tested individually or in small groups of up to five. They were allocated at random to the different experimental conditions.

Materials.

The prose passage was identical to the one used in Experiment One, except for some minor modifications to passages which, in the original, would not have been entirely clear to students who listened to the material, rather than read it. Thus " experiments reported recently in *Science* " was altered to " experiments reported recently in the journal, *Science* " and " by Drs. Peter Hobbs and L. F. Radke " was changed to " by Dr. Hobbs and Dr. Radke." In one of the three presentation conditions the passage was presented at dictation rate. For this each phrase was read out, following which sufficient time was allowed for subjects to copy it before the next phrase was heard. The total duration of the tape was 12 minutes, at an overall rate of 24 words per minute. On the other tape (normal speaking rate) the tape was presented three times at a rate of 72 words per minute, the total duration again being 12 minutes.

Design and procedure.

All subjects were informed that they were taking part in an experiment on learning and remembering. Each individual was allocated to one of six conditions in a 3×2 experimental design. The two independent variables were (1) Presentation and (2) Subject Activity. Presentation took three forms : A, a written version of the materials which each subject read on his own ; B, auditory presentation at dictation speed ; and C, auditory presentation three times at normal speaking rate. In each case the total time allotted to presentation was 12 minutes. The second independent variable, Subject-Activity, took two forms : X, recording the content by writing down a copy of it, and Y, no overt response. Thus, there were six conditions in all as follows :

AX read and record (copy) ;
AY read ;
BX listen to presentation at dictation speed and record ;

BY listen to presentation at dictation speed ;
CX listen to presentation at normal speaking rate (three times) and record ;
CY listen to presentation at normal speaking rate.

All subjects were asked to pay close attention to the subject matter of the article, and they were told that they would subsequently be asked what they could remember. After the 12 minute presentation period subjects were given a task, lasting seven minutes, which required considerable concentration, and was designed to prevent rehearsal. The task materials contained a number of arguments for and against slavery, which subjects were required to classify in a logical manner. It has been shown (Howe, 1970a) that tasks of this kind, albeit of a short duration, produce considerable forgetting from short-term memory. Therefore, when recall tests are subsequently administered one can assume that scores reflect relatively stable long-term memory or learning, rather than immediate memory, and hence provide reliable predictors of performance after longer periods of time.

All subjects received identical recall instructions, namely, to attempt to write down all the passage, as accurately as possible, including as much of the meaningful content as possible, when the precise words were forgotten. Twelve minutes were allowed for recall. Scoring procedures were identical to those of Experiment One.

RESULTS

Analysis of variance showed the effects of each of the main variables to be statistically significant. For presentation (1), F (1/90=21·82, $P<\cdot 01$. For Subject Activity (2), F (2/90)=9·70, $P<\cdot 01$. The mean scores for the individual conditions were as follows :

	X	N	SD
AX read and record	14·7	16	4·7
AY read	18·5	16	2·5
BX listen at dictation speed and record	13·3	16	4·3
BY listen at dictation speed	12·6	16	5·9
CX listen at normal rate and record ..	8·7	16	3·6
CY listen at normal rate	17·6	16	3·4

The Neuman-Keuls test was used to assess the statistical significance of the differences between the individual pairs of means. Among the 15 pairs that can be thus tested all differences were significant at or beyond the $<\cdot 05$ level except those between AY and CY, AX and CY, AX and BX, AX and BY, and BX and BY.

We can first ask, what are the effects of subjects' activities ? It is clear that the answers depend upon the condition of presentation. Thus, with written presentation, subjects who simply read the prose passage performed better than those who were also required to record the information by copying it (AY>AX). However, with auditory presentation at dictation speed there was no significant difference between individuals who recorded the passage and those who simply read it (BX and BY), and among subjects who listened to the passage at normal speed those who merely listened (CY) obtained subsequent recall scores twice as high (17·6 compared with 8·7) as subjects who had to record the information (CX).

Alternatively, we can ask, what are the effects of the differing presentation conditions ? In this case, as we might expect from the foregoing analysis, we find that the answers depend upon the kinds of activities that students are required to undertake as they attend to the incoming information. Thus, recall performance following written presentation did not differ from that following auditory presentation at dictation speed when subjects had to record the information (AX and BX), but written presentation was significantly superior to auditory presentation at dictation speed when subjects did not undertake any copying activities (AY>BY). However, the reverse is true when written presentation is compared with auditory presentation at normal speed. In this case, among subjects who recorded the information written presentation was superior (AX>CX), but for subjects who did not record the materials there was no difference between these two presentation conditions (AY and CY). Presentation at dictation speed resulted in superior recall to that occurring with presentation at normal speed among subjects who copied the materials (BX>CX), but in inferior recall scores among subjects who were not engaged in recording activities (BY<CY).

DISCUSSION

The findings of Experiment Two are in accord with the suggestion that the apparent discrepancy between the expected results and the actual findings of Experiment One were due to the authors' failure to give full consideration to the need to take into account the combination of both presentation conditions and subjects' activities in determining performance. Thus, the difference between the results of the experiment by Howe, Ormond and Singer (1974) and the present Experiment One does appear to be satisfactorily accounted for by the difference in mode of presentation. The findings of Experiment Two show that whereas subjects who read the material performed better if no recording activities were required, repeating the finding of Experiment One, this is not the case for subjects who listened to the prose passage, presented at dictation speed.

In general, the present results are consistent with the statement that when presentation conditions permit the individual considerable latitude to distribute his attention in whatever way he finds most valuable, subjects perform best when they do not have to submit to the constraints necessitated by having to record the information. On the other hand, it appears that when subjects are already constrained in the manner in which they can direct their attention, as in the case with auditory presentation at dictation speed, the requirement to record the passage does not impose any further constraint. Hence, performance is no poorer, the findings of the present experiment showing a non-significant difference favouring the subjects who actively copied (BX) over those who merely listened (BY).

It is interesting to note that there were no significant differences in level of recall following written presentation and auditory presentation at normal speaking rate (AY and CY). Differences emerged only when subjects were required to engage in recording activities. It is also worth noting that the two conditions in which the conditions of presentation and the subjects' requirements intuitively appear to be most incompatible, that is listening without overt response to material presented at dictation speed (BY) and attempting to record material presented at normal speech rate (CX), were those in which the lowest average performance scores were observed.

Two broad conclusions emerge. First, while it is certainly the case that previous experimental findings have produced ample evidence that subjects' activities can have large effects upon performance at learning tasks, one cannot assume that requiring subjects to respond actively invariably leads to increased learning. The reason for this appears to be that such requirements may inadvertently place constraints upon subjects' freedom to adopt effective strategies or to distribute their attention and energies in a maximally effective manner. Secondly, if the results of research into meaningful human learning are to have any real generalisability, it is most important that both presentation conditions and subjects' activities are considered, and not merely one or the other, as it is the interaction of these two factors that largely determines the outcome.

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THE SIGNIFICANCE OF STIMULI ON CONSERVATION OF NUMBER WITH EDUCABLE MENTALLY RETARDED CHILDREN

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SUMMARY. This investigation studied the differential effects of the significance of stimuli on educable mentally retarded (EMR) children in a conservation of number experiment. The sample consisted of 30 low and 30 middle SES children attending classes for the EMR. The effect of using candies or paper-clips was investigated in Piaget's one-to-one correspondence task. A significant interaction between SES and the significance of stimuli was found. This was discussed in terms of the possible misdiagnosis of lower class children, multiple criteria diagnostic procedures, and the relevance of cues.

INTRODUCTION

AN individual capable of conservation has by definition attained the stage of concrete operations (Piaget, 1968). Since number is among the first dimensions an individual conserves (Inhelder, 1968), conservation of number can be used to indicate the onset of concrete operations. It is important to know if an individual is capable of conservation of number for two reasons. First, since learning is dependent upon an individual's level of cognitive functioning (Iano, 1971 ; Piaget, 1964), educators can utilise the knowledge of their students' level to determine appropriate curricula. Second, only when a child can conserve does he possess the skills necessary to rational activity (Piaget, 1965). In other words, for a child to understand the concept of number, he must be able to recognise that it is quantitatively invariant despite qualitative changes among its elements.

The one-to-one correspondence experiment, described by Piaget (1965), is one of the most frequently used in studies of conservation of number. However, potentially important variables are often neglected. Uzgiris (1964) found that her stimuli differentially affected performance on conservation tasks. Similarly, Kahn and Garrison (1973) found that children may evidence conservation of number when presented with a meaningful stimulus (candies which the child was permitted to eat) and evidence a lack of conservation of number when presented with a non-meaningful stimulus (paper clips which the child could not keep).

A considerable body of research (Inhelder, 1968 ; Stephens *et al.*, 1972 ; Stephens *et al.*, 1969 ; Woodward, 1959, 1961, 1962) has indicated that except for the inability of retarded children to achieve the level of formal thought and their generally slower rate of cognitive growth, the developmental sequence of the educable mentally retarded (EMR IQ range is 50–75) does not differ fundamentally or qualitatively from that of children of average measured intelligence. Specifically Piaget's (1965) description of the acquisition of conservation of number has been found to be appropriate for EMR children as well as average-intelligence (Stephens *et al.*, 1972 ; Woodward, 1961).

Sigel (1971) and Sigel and McBane (1967), in studying classification skills relevant to conservation of number, found that the presence or absence of a classification skill was more dependent on the nature of the stimulus with low socioeconomic (SES) children than with middle SES children. Other recent research (Kahn, 1974) has suggested that, while middle SES adolescents classified as EMR are probably correctly diagnosed for the most part, low SES adolescents classified as EMR are often misdiagnosed as retarded. It was, therefore, considered important for the present study to examine the effects of the meaningfulness of the stimulus materials on conservation of number with EMR children of both low and middle SES.

The following hypotheses were tested :

(1) The use of meaningful stimuli (candies which the child could eat) would result in more frequently observed conservation than the use of non-meaningful stimuli (paper clips which the child could not keep).

(2) Observed conservation responses with the meaningful stimuli would be more frequent among the low SES children than among the middle SES children.

METHOD

Subjects.

The sample consisted of 30 low SES and 30 middle SES children attending classes for the EMR. The low SES children were living in census tracts with median family income being less than $6,000 and the median value for a housing unit being less than $6,500. The middle SES children were living in census tracts with median family income being more than $12,000 and the median value for a housing unit being more than $15,000.

Placement in an EMR class was done on the basis of the recommendation of the school psychologist, which was determined primarily by an IQ test. The mean IQ for the total sample was 68·9. No children were used in this study who had IQs less than 55 or greater than 75.

The low SES group had a mean chronological age (CA) of 10–8 and a mean mental age (MA) of 7–3. The middle SES children had a mean CA of 10–5 and a mean MA of 7–4. Differences among the two SES groups for CA ($F<1$; $df=1/58$: $P>\cdot10$) and MA ($F=1\cdot58$; $df=1/58$; $P>\cdot10$) were not statistically significant.

Procedure.

The materials and procedure used in this study were similar to those described by Kahn and Garrison (1973). The task consisted of Piaget's (1965) one-to-one correspondence task. Each subject had three trials with the candies and three trials with paper clips. Two weeks separated the two sets of trials and each set of three trials was given first to one half of the subjects in each SES group to eliminate any order effect (Kahn and Garrison, 1973). When the candies were the stimulus, the child was told he would be allowed to have one of the rows. For each trial, the subject was asked, " Does one of the rows have more paper clips (candies), or do they both have the same number ? " The subject's response was followed with the question, " Why ? "

Since Piaget (1965, 1968) insists that conservation requires operations, the criterion for conservation on a given trial was that the child responded that the two rows still had the same number of stimulus items and that in his explanation he gave evidence of either reversibility (e.g., they can be put back the way they were), identity (e.g., nothing was added or taken away) or compensation (e.g., as one row gets longer it also gets more spread out). For a child to be classified as a conserver for a given stimulus, he must meet the criterion on all three trials with that stimulus material.

RESULTS

The data analysis was accomplished using a two-way, repeated measures analysis of variance proposed by Mandeville (1972) as an appropriate technique for analysing dichotomous data. The results of this analysis are reported in Table 1. The difference between the means of the low and middle SES groups was found to be significant (F=7·32 ; df=1/58 ; P<·01), with the low SES group demonstrating conservation more often than the middle SES group. It was also found that conservation was observed significantly more often with candies than with paper clips (F=25·79 ; df=1/58 ; P<·01). However, in addition to the two significant main effects, the interaction of SES × Stimulus was found to be significant (F=7·23 ; df=1/58 ; P<·01) and, therefore, accounts for the main effects. The interaction is readily seen in Table 2.

TABLE 1

ANALYSIS OF VARIANCE FOR SES AND STIMULI.

Source	df	MS	F
Between Subjects	59	—	—
SES (A)	1	2·41	7·30**
Subj. w. groups	58	·33	—
Within Subjects	60	—	—
Stimuli (B)	1	2·41	26·78**
A×B	1	·68	7·56**
B×Subj. w. groups	58	·09	—

** P< ·01.

TABLE 2

NUMBER OF CONSERVING RESPONSES OF THE LOW AND MIDDLE SES CHILDREN FOR THE TWO STIMULI.

Socioeconomic Group	Stimuli		
	Candies	Paper Clips	Total
Low	26	13	39
Middle	13	9	22
Total	39	22	61

Simple main effects (Kirk, 1968) were used to determine the nature of the interaction. It was found that low SES children demonstrated conservation significantly more often with candies than with paper clips (F=13·4 ; df=1/116; P< ·01). It was also found that low SES children demonstrated conservation with candies significantly more often than middle SES children (F=31·33 ; df=1/58;

P< ·01). No significant differences were found between the two SES groups with paper clips or between performance with candies and paper clips for middle SES children. The results of this analysis are reported in Table 3.

TABLE 3

SIMPLE MAIN EFFECTS FOR INTERACTION OF SES × STIMULI.

Source	df	MS	F
Between Subjects :			
Between A at B_1	1	2·82	13·73**
Between A at B_2	1	·26	1·27
Within Cell	116	·21	—
Within Subjects :			
Between B at A_1	1	2·82	31·33**
Between B at A_2	1	·26	2·89
B × Subj. w. groups	58	·09	—

**P< ·01.

DISCUSSION

The data indicate support for both of the stated hypotheses. The findings of Kahn and Garrison (1973) demonstrated that, with average-intelligence children, conservation of number is more frequently observed when candies (which the child can keep) are used than when paper clips are used. The present study has supported the generalisation of these earlier findings to children classified as EMR. Since the MAs of the children in this study were at approximately the median MA for the initial finding of conservation of number by Stephens *et al.* (1972), it seems likely that many of the children would have recently attained this level of conservation. It also seems plausible that children, who had recently attained the ability to conserve, may only demonstrate this ability under optimal conditions which would include the stimulus being of high significance to the child. Therefore, the interpretation suggested by Uzgiris (1964), that attention is greater for different stimuli and, therefore, performance varies according to the stimuli utilised, is considered the best interpretation of the present data.

The present study, however, was not merely a replication of earlier research. An attempt was made to determine the effect of SES on the attainment of conservation by EMR children using different stimuli. Sigel's (1971) research indicated that low SES children are more dependent on the stimulus materials than are middle SES children. Sigel used the concept of psychological distance in order to account for this difference, that is, to the extent that stimulus materials were familiar and part of the psychological field of the child, he was able to deal with them. The finding of a difference in observed conservation between the candy and the paper clip trials by the low SES group appears to be in keeping with Sigel's findings. However, he found middle SES children to be performing at a higher level than the low SES children while the present data indicates the opposite. Sigel's study and others which demonstrated a more advanced stage of cognitive functioning for middle SES children than for low SES children (Almy *et al.*, 1966 ; Baker and Sullivan, 1970 ; Goodnow, 1962), involved average-intelligence children. The present study, on the other hand, involved EMR children. These data indicate support for the second hypothesis, suggested because of the earlier findings of Kahn (1974). In that study, a significant number of low SES adolescents classified as EMR achieved formal thought while none of the middle SES adolescents classified as EMR achieved this level of thought. Since an individual who achieves formal thought is by definition (Inhelder, 1968) considered to be not retarded, the conclusion was that low SES children are frequently misdiagnosed as being retarded. The present study appears to add support for this conclusion.

Two important conclusions can be derived from this investigation. First, since the low SES children demonstrated conservation of number more often than the middle SES children of equivalent IQ, the usefulness of the IQ test as a diagnostic tool with low SES individuals is placed in further doubt. It is, therefore, suggested that multiple criteria, as suggested by Garrison and Hammill (1971), be used in determining an individual's level of functioning and, thereby, his class placement. Further research, of a longitudinal nature, is necessary to determine the relative effectiveness of IQ tests and multiple criteria in predicting both academic and occupational success of low, middle, and high SES levels.

Second, this study has important implications for educational and testing practices. Since the assessment of a child's readiness for learning is based on his demonstration of skills indicative of cognitive structures, using meaningful stimuli in both formal and informal testing seems called for. In addition, teaching with meaningful materials may provide greater attention and motivation in the classroom which will, in turn, lead to more rapid cognitive growth and academic success. The findings of Zeaman and House (1963) and Zeaman (1965) indicate that the retarded have difficulty attending to relevant cues. The present findings appear to indicate a similar difficulty by low SES children and suggest a possible technique for maximising the salience of cues in teaching and testing situations.

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RESEARCH NOTES

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TEACHING SPELLING

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SUMMARY. The effectiveness of five presentation methods were compared for the teaching of spelling to 359 children in 10 third-year junior classes. The learning method involved the study of the whole word, the ' hard spot,' or the individual letters of each spelling ; the presentation of the words being in either list form or in context. Analyses of variance results indicated that the most effective approach to use with a class was one which used a whole word method of learning where the words were presented in context.

INTRODUCTION

Increasingly over the past few years concern has been expressed regarding the standard of spelling. While experts agree that children need to be given a method of learning to spell, and that instruction should be systematically planned (Bennett, 1967 ; Fitzgerald, 1951 ; Peters, 1970), views vary as to which approach is the most effective.

Some (Hanna and Hanna, 1967 ; Schonell, 1942 ; Strickland, 1955) advocate a multisensory approach to learning, but others such as Russell (1937) suggest that the use of lip and throat muscles can be as effective as actually writing the word during the learning. The necessity for pronunciation of the word is not disputed.

Regarding the presentation of the words, Horn (1958), after summarising the evidence, suggests that list rather than contextual presentation is superior. However, as McKee (1939) pointed out, the context used is often formal, and he suggested that a story presentation might be effective. Freyberg (1960) supports this view.

In investigations into the learning method the findings are often contradictory. Whereas some (Hartmann, 1931 ; Higley and Higley, 1936) advocate whole word learning, and authorities such as Fitzgerald (1951), Gates (1937) and Horn (1960) think that drawing attention to the ' hard spot ' a dubious practice, others, such as Gilbert and Gilbert (1947) and Wolff (1952) suggest that attention to the ' hard spot ' can be beneficial.

Much of the confusion is caused by different interpretations of the term ' hard spot,' and by the lack of clarity regarding the control of the learning methods.

The following investigation was designed to determine, if possible, a systematic approach which could be used with a whole class for the teaching of spelling.

METHOD

Sample.

The sample consisted of 359 children in 10 third year junior classes. Half the classes were in schools in predominantly middle class areas, and half were in predominantly working class areas. 118 children could be classified as non-manual, and 164 as manual, based on the father's occupation. For 77 of the children the social class was unknown.

Procedure.

The five classes in each area were assigned at random to one of five presentation methods. Words were presented either in context or in list form, and the method of learning involved studying either the whole word, the 'hard spot' or the individual letters of each spelling. The letters P, Q, R, S and T were used to designate the methods described in Table 1.

TABLE 1

THE FIVE PRESENTATION METHODS.

Presentation Method	Presentation	Method of Learning
P	List form of isolated words.	Whole word.
Q	List form of words+meanings	Whole word.
R	Initially in a story, then words+meanings+use in sentences....................................	Whole word.
S	Initially in a story, then attention to 'hard spots' +meanings+use in sentences	Part word.
T	Initially in a story, then attention to individual letters +meanings+use in sentences	Part word.

The children were required to learn half the spellings orally and half using a written response. The daily learning task was four or six words (see Table 2).

TABLE 2

SET VARIATIONS.

Set Number	Daily Learning Task	Response Mode
2	4 words	written
3	6 words	oral
4	6 words	written
5	4 words	oral

The learning programme extended over a school term. The 120 words to be learned were taken from Level 4 of 'The Alphabetical Spelling List' compiled by the New Zealand Council for Educational Research (1960), and grouped into five sets. The first set was considered as a trial run and the results were not included in the analysis. In order to determine the part of a word where most spelling errors occurred the words were previously tested on 300 children.

Where the learning method was the whole word (presentation methods P, Q and R), the children were given a procedure for learning the spellings. This consisted essentially of the child first looking at the whole word ; seeing with the eyes shut ; checking that they saw the word correctly ; copying or looking at the letters of the word ; checking ; spelling from memory without looking at the word being learned ; checking that they were right and repeating until the word has been spelled correctly twice in succession.

These three treatments differed in the presentation of the spellings. The words were presented in list form for presentation methods P and Q, but whereas the former gave the words to be learned only, the latter also gave the meaning or meanings of each word. Treatment R presented the words in context. In addition to the meaning of each word sentences were also given to illustrate their use. The 24 words for each set were woven into a short story and used for the initial presentation of the set of words to be learned.

The same stories were used for the initial presentation of the words for the other two treatments which also presented the words in context. In presentation T the method of learning was to focus on the individual letters of the word separately, and in presentation S to concentrate on the 'hard spot,' defined as the area of the word most likely to cause difficulty. Linear programmes, using a horizontal format were used to present each set of words.

In order to standardise the presentation methods and to control the teacher variable, tape recordings were used for the pronunciation of the words, the presentation of the stories and the method of working through each set.

Computer facilities were available, and three analyses of variance were carried out, using the average gain scores as a measure of learning, to test the results.

The first analysis of variance, shown in Table 3, was with the whole sample (N=359). With the learning programme extending over a whole term not every child completed all the sets of work. Furthermore, the large group of children whose social class was unknown might have distorted the results. Therefore, two further analyses were done in order to see if the findings of the first analysis would be confirmed. The second analysis of variance, in Table 4, used as subjects only those children of known social class who completed all the sets of work (N=124). The third, in Table 5, was for an equal cell design to specifically account for the nesting relationship of the response mode and the daily learning task variables (N=50).

TABLE 3

ANALYSIS OF VARIANCE—WHOLE SAMPLE (N=359)

Source of Variance	SS	DF	MS	F	P<
Between Presentation Methods	345·9	4	86·5	8·61	·001
Between Social Classes	221·5	2	110·8	11·02	·001
Between Response Sets	11·6	1	11·6	1·16	NS
Between Number of Words Learned daily	105·0	1	105·0	10·45	·001
Interaction Presentation × Social Class	402·4	8	50·3	5·01	·001
Interaction Presentation × Response Set	96·1	4	24·0	2·39	·05
Interaction Presentation × No. words learned	68·1	4	17·0	1·70	NS
Interaction Social Class × Response Set	20·5	2	10·2	1·02	NS
Interaction Social Class × No. words learned	4·7	2	2·3	0·23	NS
Interaction Response Set × No. words learned	52·7	1	52·7	5·25	·02
Interaction Presentation × Social Class × Response Set	19·5	8	2·4	0·24	NS
Interaction Presentation × Social Class × No. words learned	74·9	8	9·4	0·93	NS
Interaction Presentation × Response Set × No. words learned	74·4	4	18·6	1·85	NS
Interaction Social Class × Response Set × No. words learned	14·8	2	7·4	0·74	NS
Interaction Presentation × Social Class × Response Set × No. words learned	50·8	8	6·4	0·63	NS
Error	11061·1	1101	10·0		

TABLE 4

ANALYSIS OF VARIANCE FOR CHILDREN OF KNOWN SOCIAL CLASS WHO COMPLETED ALL SETS OF WORK.
(N=124)

Source of Variance	Wilks' Lambda	F	DF	P<
Between Presentation Methods	·81	2·09	12 299·26	·02
Between Social Classes	·89	3·59	4 113·00	·01
Interaction Social Class × Presentation..	·92	0·79	12 299·26	NS
Full Model	·64	1·91	28 408·85	·01

TABLE 5

ANALYSIS OF VARIANCE FOR AN EQUAL CELL DESIGN:
(N=50)

Source of Variance	SS	DF	MS	F	P<
Between Response Sets	9·2	1	9·2	1·37	NS
Between Daily Learning Tasks	66·1	1	66·1	13·70	·001
Error Term for Between Response Sets	269·9	40	6·7	—	—
Error Term for Between Daily Learning Tasks	193·1	40	4·8	—	—

RESULTS

(1) A systematic approach to the learning of words led to an improvement in spelling performance. A 't' test showed that there were significant differences ($P < \cdot 001$) between the average pre- and post-test scores.

(2) Children in the manual social class group made significantly higher gain scores than those in the non-manual group ($P < \cdot 001$ for whole sample ; $P < \cdot 01$ for reduced sample size).

(3) Significant differences were found between the effectiveness of the presentation methods used in the experiment ($P < \cdot 001$ for whole sample ; $P < \cdot 025$ for reduced sample size).

(4) The approach which presented the words in context and which used a whole word method of learning was the most effective one with a class as a whole. (Presentation method R.)

(5) Highly significant differences were found between the tasks of learning four or six words daily ($P < \cdot 001$). Higher average gain scores being obtained by the children when the daily learning task was six words.

(6) There were no significant differences between learning using an oral or written response.

DISCUSSION

Whereas the two social class groups obtained slightly higher gain scores on different presentation methods, these differences were not significant. Therefore, within the limits of this investigation, the best systematic approach to the learning of spellings seems to be one which presented the words in context and which used the whole word method of learning.

Indications were that the manual social class group benefited more than the non-manual group from being given a structured approach, ensuring that the children concentrated on the words to be learned. It is difficult to explain why such social class differences in the learning existed. Before starting the programme of work, the children were given the Daniels and Diack 'Graded Spelling Test' in order to obtain a measure of the initial level of spelling achievement. A 't' test applied to the results did not show any significant difference between the two social class groups in regard to spelling ages.

De Cecco (1968) refers to the possible lack of verbal mediators and learning styles which hamper the disadvantaged child. It could be that, in the above investigation, the manual group reacted more favourably to being given a specific plan of attack, whereas the non-manual group tended, on average, to have already developed methods of approach to the study of spellings. This might mean that this group did not react so favourably to having a prescribed method of study forced upon them. However, these comments are extremely speculative. Further investigation into social class differences in the average gain score is needed before definite conclusions can be drawn.

The finding that a daily learning task of six words was more effective than one of four words also needs further exploration. It may be that there is an optimum learning task size ; or the results could have stemmed from possible differences in long and short term memory, because the learning was spread over a different number of days for the two tasks.

Although the findings showed no significant differences between the use of overt and covert responses in learning, some children, in evaluating the work they had done, stated a marked preference for the former. It would, therefore, seem advisable to allow children to choose their response mode in the learning of spellings.

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INTERACTION ANALYSIS IN INFORMAL CLASSROOMS: A CRITICAL COMMENT ON THE FLANDERS' SYSTEM

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Summary. Recent attempts to use Flanders' FIAC system to observe teacher-pupil interactions in primary school classrooms had indicated severe limitations in this approach. The method is useful in a formal situation, but it contains an implicit 'Theory of instruction.' If this technique is applied to those informal classrooms whether primary or secondary, in which the teaching-learning situation is defined more in terms of interpersonal communication than of transmission of information, the coded observations will miss out the very processes which define informal methods. Alternative procedures of observation should be adopted to take account of the context within which teachers talk to pupils and hence to assess the meaning of an interaction, as well as recording its occurrence.

INTRODUCTION

Since 1968 we have been collecting recordings of school classrooms where teachers have been attempting to put into practice some form of curriculum innovation. Although these recordings have been made within the context of a number of research projects, at least one general problem has constantly recurred. To what extent do changes in *what* is taught relate to changes in the *way* it is taught? In what ways do changes in curriculum involve changes in pedagogy?

Because these recordings have been made over a period of time, and as parts of research projects pursuing related, but different, problems, the sample we have is not a controlled experimental sample; rather it is an archive which has been selectively added to according to a set of developing principles. Nevertheless, we now have well over a hundred hours of audio visual recordings (Adelman and Walker, 1974) of classroom situations which can be broadly characterised as being 'open' or 'informal' situations. This includes recordings of teachers in primary and secondary classes, in a wide range of subject areas, and working according to a number of different educational philosophies, ideas and plans.

The problem we started with was that of trying to map varieties in the teacher's 'role' in a number of innovating classrooms, but in time this led us to look not just at the teacher's performance but at the context within which the teacher acted, not just in physical and social terms, but also in intellectual and ideological terms. In other words, we shifted our interpretive framework from the psychological into the sociological, linguistic and anthropological areas as our accumulating material caused us to view our problems as more complex than we had at first realised.

A critical point in this change of approach came as we realised the inadequacy of the processing techniques we were using to translate our recordings into data. The methods we were using were those developed in the USA by Withall (1949), Medley and Mitzel (1958), and Flanders (1970). It was, however, around the use of Flanders' method that the problems crystallised.

In this paper we have attempted to report the nature of the difficulties we encountered in using this sophisticated and increasingly widely used technique in the exploration of classroom manifestations of educational issues. Given that educational research is increasingly becoming involved in the study of problems commissioned by practitioners, rather than in the study of its own discipline-generated problems, our attack is not on the technique itself so much as on the uses to which it may be put. Our concern is that particularly in its use in evaluation and teacher development there is a distinct danger of elevating the assumptions of a research method to a theory of teaching.

PROBLEMS IN USING THE FLANDERS' SYSTEM

Perhaps the first thing we realised about using the FIAC system was that although it is possible to use it in a large *number* of classrooms, only a narrow *type* of classroom provides satisfactory coding conditions. Even when (on a suggestion of Flanders) we used radio microphone equipment to overcome acoustic and perceptual difficulties, we found that in many classrooms the talk did not fit the categories available to code it. It seemed to us that the coding system was only appropriate when classroom talk was of a public dialogue form. In the informal situations we recorded, teachers and children simply did not talk in ways which the *a priori* coding system could cope with. For example, the ' question-answer ' sequence, which is a central feature of the Flanders category system, makes little sense when applied to some of those intimate conversations between teachers and children where both are talking but where the only questions that are being asked are those asked by the children. In fact, from our research we are tempted to suggest that it is virtually a feature of ' open ' classroom situations that simple patterns of statements and responses—such as are implicit in FIAC—are rarely observed.

We would stress that this is not simply a problem calling for new or different categories, but for a different concept of talk. Talk has connotative as well as denotative meanings—what is said often depends for its significance on shared meanings which are hidden from the casual observer.

A casual observer cannot understand what is being said in a way that allows him to hear the talk as it is heard by the pupils. What he hears are the meanings available to anyone in the culture ; what he misses are the meanings only available to a participant in the relationship. In some classrooms it is often just those local, immediate and personal meanings that are educationally most significant—and any research technique that designs them out of consideration runs the risk of completely misunderstanding and misrepresenting the reality.

One dramatic example of this we observed was in a class where a student called out " strawberries, strawberries " after another student had been rebuked by the teacher for not doing his homework adequately. All the class laughed but the observer who could not see the joke. Later the observer discovered that the connotive meaning of " strawberries " was dependent on the antecedent teacher's witticism, " Your work is like strawberries. Good as far as it goes, but it doesn't last nearly long enough " (Walker and Adelman, 1975).

For the observer attempting to follow the meanings communicated by talk this incident is problematic but the Flanders observer could handle it because he does not need to understand the meanings of what is being said to participants ; he only needs to understand it in terms of his own frame of reference. (" Is it a direct or indirect question ? ") But our point is that in more complex incidents it is not only ' meanings ' but also the structure of the talk itself, for example, the nature of ' questions,' that is an item of the immediate culture. Teachers and students develop ways of talking to each other which, though at surface level may appear rambling, elliptical, jokey, anecdotal or metaphorical, may be interpreted by them as theoretical or substantive. In some classes, teachers develop ways of talking, ways of listening, and ways of enquiring (" asking questions "), where it does not seem as though they are being serious or asking questions at all, but careful inspection of their talk in relation to actions reveals that very often they are exploring difficult and complex areas in a sensitive way.

Our impression is, from reading the research, that Flanders' technique is suited to the study of classrooms where talk is used merely as a *transmission* coding, as part of a communication system where one person transmits messages while others receive. But to discover what makes a question a question in the kind of talk we have described means looking beyond *what* is said to how, why, where and to whom it is said. It means looking beyond the immediate action to its antecedents and consequences. In other words, on-the-spot analysis is theoretically impossible for it demands some account of the prospective and retrospective elements of action. Theoretically it also demands that we look at any incident in terms of continuously changing relationships between talk and identity-for-self and identity-for-others within their social context, and this is something that can only be guessed at from the observation of the surface facets of action.

The second major problem we have found with the Flanders system relates strongly to the first. We find it is useful as a survey instrument but find that it does not stand up to ethnographic documentation. Some researchers have recently used FIAC as a basic outline to 'fill-out' by ethnographic methods (Delamont, 1973 ; Nash, 1972). Our experience is that the underlying dichotomies inherent in the system will not stand up to this kind of data saturation. In the classrooms we have observed and recorded the FIAC system does not fit and its underlying theoretical basis is inadequate. The distinction between 'direct' and 'indirect' teaching *styles* did not help us in conceptualising a set of classrooms where 'teaching style' seemed less significant than either the structure of the classroom situation in communication terms, or the teacher's beliefs and values concerning knowledge. Such individualistic behavioural notions can only be applied within taken-for-granted contexts. We believe that the classes we have recorded are radically different forms of social situation from those reflected in the literature on interaction analysis in that they involve talk as a reflective activity. The implication of this, we believe, is that research has been continued with the idea that classrooms have a peculiar common structure which they need not necessarily possess.

In the classes we have recorded, people talk to each other in a way that appears quite different from that normally heard in schools. Their talk is not simply based on what Halliday (1969) calls "a representational model" but exploits other quite different forms. The talk is not simply 'informal' in *style*—it incorporates radically different conceptions as to the relationship between role and identity which can only be elucidated by moving into areas of research quite different from those which underly Flanders' technique.

The limitation of the applicability of the FIAC system to one model of classroom talk restricts its use in the evaluation of curriculum innovation—where the intention is often to create or introduce changes in role and concomitant talk (HCP, Nuffield Science, etc.). For the assumptions built in to FIAC appear very similar to those rejected by the innovators—the problem is not simply seen as being one of trying to get from a 'direct' to an 'indirect' style of teaching within a didactic conception of education—but as trying to create quite new social contexts within which teacher and students can communicate.

The same problem arises again in teacher education—FIAC incorporates a set of values about teaching, which, if treated as a total theory, have the effect of crippling the teacher's actions. Instead of opening alternative options, it is used to close and to control. For instance, conventional microteaching is often based on a rather narrow instructional model of teaching buttressed by self-fulfilling assessment based on FIAC.

SUMMARY AND SUGGESTIONS

Flanders' system for the analysis of classroom interaction is limited by its inherent conception of talk. This limits it to seeing teacher-student interaction in terms of the *transmission* of information, sometimes one-way, sometimes two-way. It does not concern itself with talk as the expression and negotiation of meanings ; as the medium through which people see themselves as others see them. The underlying concept is simply one of information-exchange, it does not touch on the relationship between talk and knowledge, between talk and identity, both for oneself and for others. In short, it sees talk as transmission, not as communication.

The descriptions it produces of clasroom situations are, to borrow two technical terms from anthropology, *etic* not *emic*, see (Harris, 1968). That is to say, their meanings are totally dependent on the outsider's frame of reference—they make no concessions to the immediate cultural milieu. There is no attempt to account for, or to explore the alternative perspectives available to teachers or students—to take their realities as an essential element of the situation.

There is no distinction drawn between *action* and *behaviour*, *praxis* and *process*. As a result behaviours are simply seen as produced by 'actors' in a mechanical way. In choosing to reject intentionality as an area for description the technique has no way of discovering *why* people do things, or of accounting for the large amount of time in some classes that is taken up in the exploration of motives.

Its concern with *denotative* meanings leads it to see talk as a surface feature of action and to miss the many, and often paradoxical, meanings that emerge from seeing talk in its full context.

These limitations restrict the use or FIAC system to that of a survey instrument in the study of certain types of formal classroom situation. It is a valuable initial research tool—just as IQ tests can be useful in the context of particular research problems. Its use is dangerous where the technique is used as a substitute for educational theory—for its theoretical basis is weak, unsound and inadequate.

Finally we would like to note what we feel needs to be taken into account when classroom situations are to be analysed within the different kinds of demands that are more usually typical of educational situations.

First, talk needs to be considered in terms of the structure of its situation. When classroom situations are formal, or centralised, talk has characteristics quite different from when the situation is informal or decentralised.

Second; talk needs to be considered in relation to the tasks being defined and the resources available for their resolution. Sometimes talk will itself define the task and be the resource, but on other occasions task and resource may lie outside the realm of talk.

Third, talk needs to be considered in relation to the set of relationships it encompasses.

Taken overall these three conditions constitute a demand for viewing talk within its context ; for substituting a more complex reality for the 'verbal behaviour' studied by interaction analysis.

Modern methods of recording, particularly in the audio-visual field, have made available a whole new source of data for educational research that allow it, as never before, to overcome technical problems of reliability, validity and design and so to address a range of problems and issues that are not simply derived from its constituent disciplines but which are of general educational interest. But if research is to enter direct study of education in action then it is essential that the methods and technique used do not isolate the researcher from the situation under study. As Flanders himself has warned : " The procedure makes no sense at all when what is lost by the process is more important than what is gained " (1970, page 30).

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THE PERCEPTION OF ADOLESCENT PROBLEMS BY THEIR PARENTS

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Summary. The Mooney Problem Checklist was administered to a sample of 109 adolescents and both of their parents drawn from metropolitan Sydney. Product-moment correlation coefficients showed that the same sex parents had greater awareness of the adolescents' problems than the opposite sex parents. All parents were ill-informed in the area of courtship, sex and marriage but they had more insights into problems in the home. Both parents were more aware of problems associated with health and physical development in the girl than in the boy.

INTRODUCTION

Remmers and Spencer (1950) asserted the self-evident proposition that all young people have problems, while Pope (1943) concluded that youth do not just take life as it comes as is so frequently voiced by adults. Accepting these two propositions, the aim of the present research was to ascertain how much insight parents had of the problems of adolescents which in turn would indicate the areas in which the parent-child communication gap was the greatest.

The Mooney Problem Checklist has been used extensively in the study of the problems of the adolescent (Abel and Gingles, 1965 ; Amos and Washington, 1960 ; Arnold and Mooney, 1943 ; Garrison and Cunningham, 1952 ; Kuhlen and Bretsch, 1947 ; Mooney, 1942, 1943 ; Mooney and Gordon, 1950 ; Morgan, 1969). As a research tool a checklist is only useful when the adolescent recognises his problems, finds that they are listed and is willing to record them. McIntyre (1963) found sufficient evidence to suggest that the Mooney Problem Checklist met these requirements and the Commission on Youth Work (1970) concluded that the problems of youth in Australia were basically the same as the perennial problems of youth in any developed Western civilisation. These two latter studies suggested that the Mooney Problem Checklist would be a useful instrument to study the problems of a group of adolescents living in Sydney.

The specific question, to which the present research was addressed, was concerned with whether or not the parents of adolescents were aware of the problems facing their sons and daughters and the extent to which parents of the same or opposite sex were able to perceive the areas in which these problems were encountered.

METHOD

Sample.

A total of 327 persons were included in the sample. There were 47 male and 62 female adolescents between the ages of 17 and 19 years together with both of their parents. They were resident in the northern and north-western suburbs of the Sydney metropolitan area and would generally be classified as belonging to the middle and upper middle classes according to the Congalton (1969) scale.

Procedure.

The whole sample completed the 1950 revision of the Mooney Problem Check List (College Form) independently and in their own homes. The completed forms were submitted without any consultation among the respondents. The adolescents were asked to complete the problem check according to the instructions whereas the parents were asked to complete it according to their perceptions of the particular problems that their son or daughter had. Product-moment correlation coefficients were calculated using the Omnitab computer program for each of the dyads : father-son, father-daughter, mother-son and mother-daughter on total problems and each of the problem areas specified on the checklist : health and physical development ; finance, living conditions and employment ; social and recreational activities ;

social psychological relationships ; personal psychological relationships ; courtship, sex and marriage ; home and family ; morals and religion ; adjustment with school work ; future vocational and educational problems ; and curriculum and teaching procedures.

RESULTS AND DISCUSSION

The results clearly indicate that the same sex parent is more aware of the adolescent's problems than the spouse of the opposite sex. The correlation between the total number of problems checked by the male and his father's perception of his problems was ·66 while it was only ·34 between the male and his mother's perception of his problems. A similar result was found for the female. The correlation, between the total number of problems checked by the female adolescent and her mother's perception of these was ·72, while the father's perception of these problems correlated to the extent of ·34. It is apparent that while the same sex parent is more in tune with the adjustments of adolescents, the mother is closer to the daughter. All the correlations for the mother-daughter dyad were significant at the $P < \cdot 001$ level except for the problem area Courtship, Sex and Marriage, which was significant at the $P < \cdot 05$ level. Further, the correlation for the mother-daughter dyad was the only one to reach significance in this area of Courtship, Sex and Marriage. From this it could be inferred that mother-daughter communication or empathy is higher than any of the other three dyads within the family.

The correlation coefficients between the four dyads within the family for each of the specific problem areas are shown in Table 1. It is clearly evident that the area with the lowest relationship in all cases is concerned with Courtship, Sex and Marriage which probably indicates a reticence on the part of the adolescent to communicate problems in this area to the parents. This result supports the contention of Shipman (1968) that sex communication appears to be negligible for three of the parent-child relationships : father-son, father-daughter and mother-son while even in the mother-daughter relationship the range is from excellent to very poor.

TABLE 1

CORRELATION COEFFICIENTS BETWEEN ADOLESCENT PROBLEM AREAS AND AREAS AS PERCEIVED BY PARENTS.

	Male Adolescent		Female Adolescent	
	Father	Mother	Father	Mother
Health and Physical Development	·44	·35	·60	·61
Finance, Living Conditions and Employment	·33	·37	·31	·64
Social and Recreational Activities......	·42	·19*	·30	·68
Social Psychological Relationships	·52	·38	·36	·63
Personal Psychological Relationships..	·48	·20*	·30	·58
Courtship, Sex and Marriage	·20*	·13*	·09*	·29
Home and Family	·54	·54	·39	·61
Morals and Religion	·34	·25*	·40	·62
Adjustment School Work	·49	·29	·13*	·60
Future, Vocational and Educational ..	·57	·30	·10*	·66
Curriculum and Teaching Procedures ..	·61	·48	·41	·44
Total, All Problem Areas	·66	·34	·34	·72

* Not significant ; all other correlations were significant ($P < \cdot 05$).

Quite understandably the second lowest overall correlation was in the area of personal psychological relationships. It is in this area that the most personal and private problems of the inner-self which necessarily are of a covert nature lie and the adolescent might not be expected to communicate them to the parent. Other areas where overall parent-child correlations were low were those concerned with adjustments to school work and social and recreational activities. However, mothers had greater knowledge of the problems associated with the social and recreational activities of their daughters while fathers had a greater knowledge of the problems associated with curriculum and teaching procedures and the future, vocational and educational problems of their sons.

Highest overall concordance was found in the area of problems of adjustment within the home and family. Ausubel (1954) claimed that parent-child conflicts in the home were greater during adolescence than at any other developmental stage and it is obvious that if all parties are involved in this conflict the parents should be aware of the specific problems of adjustment that the child has. Both parents have better insights into problems associated with health and physical development in the girl than in the boy. This could be interpreted in terms of the greater reluctance on the part of the boy to communicate in an area which may reflect on his masculinity. Suttie (cited by Hemming, 1967) referred to this reluctance as the " taboo on tenderness " which made boys shy about sharing problems in case it would make them appear soft.

In conclusion, it would appear that parents are generally not aware of the problems confronting their adolescent sons and daughters. The opposite sex parent has very little knowledge of adolescent problems and, of the four dyads considered, mother-daughter correlations were highest indicating that mothers have a greater awareness of the problems of their daughters. Crow (1956) found that girls were more willing to communicate problems than were boys ; present evidence suggests that they either communicate with their mothers or there is greater empathy in the mother-daughter relationship.

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MUSIC AND TEST ANXIETY : FURTHER EVIDENCE FOR AN INTERACTION

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SUMMARY. This study investigated the existence of an interaction between music and anxiety, with the hypothesis that highly test anxious subjects would perform better in a test-like situation when background music was present than when the more usual condition of silence prevailed. 162 final year Diploma of Education and third year B.Ed. students completed Sarason's Test Anxiety Scale. Three experimental conditions were used in which students were required to study a 1,500-word passage for 10 minutes. The conditions were silence, music as the students entered and music throughout. The second group showed the highest scores on a test of the material learned.

INTRODUCTION

A previous study (Stanton, 1973) has indicated the existence of an interaction between test anxiety and music. Students at primary, secondary and tertiary levels took mid-year examinations under either conventional conditions of silence or to the accompaniment of softly played background music. A tendency for highly anxious students to perform better under the latter condition was noted, a finding confirmed by a second experiment in the laboratory situation using a larger sample of subjects. There was no evidence that the use of background music exerted a detrimental effect on overall test performance or that the performance of low-anxious students was affected in any way. The present study takes the investigation of this interaction a stage further by examining more closely the music variable.

One source of data in the original experiments consisted of subjects' introspective reports. In view of Rosenthal's (1971) findings on the effect of experimenter expectancy, it seemed wise to learn how subjects viewed their task and the situation in which they found themselves. A point which repeatedly emerged from many of these protocols involved the duration of the background music. A number of students said that they enjoyed hearing the music as they entered the examination room or the laboratory and were very conscious of its soothing effect as they settled themselves in their seats and prepared for the written task with which they were faced. However, once they commenced writing, they were no longer conscious of the music and, in fact, when they completed their task were quite surprised to realise that it was still playing. Accordingly, it seemed reasonable to hypothesise that the beneficial influence of background music on highly test anxious students might well be concentrated in the initial period of task preparation and that continuance of the music while the task was being performed would contribute no additional facilitative effect.

METHOD

Sample.

This hypothesis was tested on a sample of 162 final year Diploma of Education and third year Bachelor of Education students at Flinders University who, at an initial meeting, completed the Test Anxiety Scale (TAS) for adults (Sarason *et al.*, 1960).

Procedure.

Students were matched in groups of three on the basis of being in the same Test Anxiety score category, either test anxious if they were above the median or low in test anxiety if they were below. They were then allotted at random to one of three experimental conditions. The task students were asked to perform was the same for all conditions. It consisted of a 1,500-word passage on the social system of a mythical Martian community which subjects were asked to read carefully for a period of 10 minutes. After this time had elapsed they were to answer 20 questions testing their comprehension of the passage. Once they had done so they were asked to write down the feelings they had during the course of the experiment.

The task was presented as part of a battery of psychological tests and the introspective reports of students confirm that they did regard it as a ' test.' One group performed its task under conditions of silence, with students not being permitted to speak as they entered the room and seated themselves. The experimenter then explained the task, asked the students to turn over their papers and to commence reading. At the end of 10 minutes, the papers were turned face downwards and the questions answered. The second group entered to the accompaniment of softly played background music emanating from 8-in. speakers placed in the four corners of the room. This music, a slow movement from a Mozart symphony, continued while they settled themselves and listened to their instructions. As they commenced writing, the music was turned off. The third group entered to the sound of music which continued until the task had been completed and the questions answered.

To provide an additional source of data, a further group of 93 second year Bachelor of Education students was used. From these 93 subjects, all of whom completed the TAS, six were selected at random from among those scoring above the 75th percentile, and six from those scoring below the 25th percentile. These 12 students performed a different experimental task in an individual rather than a group setting. Three 1,500-word passages were prepared, all relating to the culture of mythical countries, and each having 14 questions testing comprehension attached. Each student read one passage and answered the questions under each of the three conditions, working alone in the experimenter's office and under his supervision. A 'test-like' atmosphere was maintained and the order in which students experienced the three conditions was varied. For example, student one read the first passage in silence, left the office for a 10-minute break, returned to read the second passage accompanied by background music during the preparation stage, left for another 10-minute break and read the final passage with music playing until the questions had been answered. Student two encountered the music during preparation condition first, then the full music, then the silence. Student three had firstly continuous music, followed by silence and preparation music in that order. Thus, in this part of the experiment, students acted as their own controls. Once again they completed introspective reports describing their feelings at the end of the experiment.

RESULTS

First Experiment.

Table 1 gives mean scores and standard deviations for each anxiety category under the three experimental conditions.

TABLE 1

MEAN SCORES AND STANDARD DEVIATIONS BY ANXIETY LEVEL AND TREATMENT GROUP. (N=162, 27 in each cell)

TAS Score Category	Test Condition					
	Silence		Preparation Music only		Music throughout test	
	Mean	SD	Mean	SD	Mean	SD
High Anxiety	12·2	2·5	14·7	2·9	14·6	2·8
Low Anxiety	14·0	3·1	13·6	2·8	13·7	2·7

As with the study reported previously, no differences in low anxiety subjects were discernible. However, high anxiety students did appear to have performed more poorly under the silence condition than under either of the music conditions. Analysis of variance confirmed the existence of this interaction between music and test anxiety ($F=3{\cdot}41$, df 2/156, $P{\cdot}<05$). The main effects, test anxiety as operationally defined by the TAS, and music, did not exercise any significant effect on student performance.

Of more importance to the hypothesis under test in the present study was the close correspondence between the mean scores recorded by the high anxiety subjects under the two music conditions. They were virtually identical, with both being significantly higher than the scores recorded by high anxiety students under the silence condition.

Second Experiment.

The same pattern was apparent when the data derived from the 12 individual students was considered. Of the six highly test anxious subjects, five recorded better 'test' scores under both music conditions than they did under the silence condition. Again, differences between the two music scores were minimal. No such pattern was, however, discernible for the low anxious individuals who showed far more similarity of scoring in the three different situations.

DISCUSSION

From the results set out above, it would seem that the facilitative effect of background music for highly test anxious individuals is exercised during the time in which the student prepares to engage in the task at hand. Having a background of music while the student enters the room, settles himself in his seat, and is informed about his task would seem to be sufficient. Continuing the music while the task is being performed does not appear to produce further gains in terms of improved test scores. It is also worth noting that neither does it seem to produce disruptive effects leading to poorer scores for either low or high anxious subjects, a confirmation of the earlier finding (Stanton, 1973).

Why, then, should a few minutes music played while subjects prepare for a task enable those amongst them who score high on the Test Anxiety Scale to improve their performance ? Relaxation seems to be the answer. The students in the rooms where music was played as a background seemed more relaxed, less tense and nervous, than did those in the rooms characterised by silence. Though they were still not permitted to talk in the test room, they smiled more often, nodded pleasantly at other students and the experimenter more frequently and generally displayed fewer facial signs of tension such as frowns and grimaces.

This view of an 'outsider,' the experimenter, was confirmed by perusal of the students' introspective reports which, in a study such as this, would appear to provide essential data. As Combs and Snygg (1959) point out :

> " The facts of human behaviour . . . are not the facts that exist for others but the facts that exist for the behaver. If it is true that people behave according to how things seem to them, then it is the things people believe which are the facts . . . " (p. 307).

In the present study, of the 81 students categorised as highly test anxious, 73 stated that hearing the music made them feel more relaxed, engendering a feeling that the test " couldn't be too bad after all." This virtual unanimity of opinion was reaffirmed by the six high anxious students who did the tests individually. All six said they felt far more relaxed when they were in the two music conditions. The introspective statements also contained items such as : " I felt more comfortable hearing the music while I waited to start," and " There didn't seem as much pressure on me as there did when there was no music," this latter comment coming from one of the students tested individually.

It is also interesting to note that of the six low anxious students tested individually, four preferred the music treatment while only one preferred the silence.

Confirming the findings of the previous study, that there is an interaction between music and anxiety such that highly test anxious students perform better in a test-like situation when background music is present and that such music does not deleteriously affect the performance of low test anxious students, the present study has also suggested that the music background is necessary only while students are preparing for their task. Once students begin their test, the music may be switched off, its work of facilitating the performance of highly test anxious students having already been accomplished.

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THE OTHER OBSERVER IN A PERSPECTIVES TASK

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SUMMARY. In Piaget and Inhelder's 'three-mountains' task a doll is used as 'the other observer.' The present experiment was conducted to investigate whether children's performance in this perspectives task would be improved if the observer was a person. Two matched groups of 20 children (mean age 6:10) were asked to select the views of another observer from a number of vantage points. A doll was used as the observer for one group and the experimenter for the other. In the experimenter group the mean correct response score was significantly higher and the mean egocentrism score significantly lower than in the doll group. This result suggests that egocentrism is not necessarily a fundamental characteristic of the young child's thinking but may result from, or be increased by, experimental design.

INTRODUCTION

Success in a perspectives task depends on an understanding that objects, or groups of objects, appear different from different viewpoints, and on the ability to predict by mental, and usually pictorial, representation the actual view from another position.

Piaget and Inhelder (1956) devised the 'three-mountains' task to study the development of perspective ability. Children were asked to choose from a selection of pictures the one which corresponded to their own view, and then the one which corresponded to a doll's view, of the mountains. The doll was placed in a number of different positions around the model. It was found that the ability to perform the task correctly progressed through a sequence of age-related stages.

Typically, young children from about 5 to 7 years chose their own view from the array of pictures and attributed it to the doll. Piaget and Inhelder considered this response to be indicative of a fundamental trait of the young child's thinking, namely egocentrism. They claimed that at the pre-operational stage the child is unable to conceive of any other perspective but his own and remains centred on a position corresponding with his present viewpoint.

Perspective ability depends on the acceptance by the subject that another person has a viewpoint and that it is different from his own. During an experiment which aimed at replicating the three-mountains task the author noted that, at first, some young children were unable to choose a picture which matched the doll's view because, they said, none of the pictures showed the doll. This response suggests that the children did not accept the doll as another observer. Since the children may, therefore, have considered themselves to be the only observers in the situation and, consequently, their own view the only one operative, their egocentric responses would be readily understandable.

It seemed likely that a young child would more readily regard another person as an observer than a doll and that this would facilitate the acceptance of the idea that another observer in a different position will have a view different from his own.

In order to test the hypothesis that performance in a perspectives task will be better when a *person* acts as the other observer than when a doll is used, two groups of children (mean age 6:10 years) were given a perspectives task. One group was asked to identify a doll's view of the objects, whereas the other was asked to identify the experimenter's view.

METHOD

Sample. The sample was selected from children in the infants' department of one large primary school.

The Goodenough Draw-a-man Test (Goodenough, 1926) was administered to 66 children aged between 6:4 and 7:3. Pairs of children were matched for sex, social class and, as closely as possible, for intelligence and age. One of each pair was randomly assigned to the doll or the experimenter group. There were 20 pupils in each group. The mean IQ score was 102 and the mean age was 6:10 for each group. Standard deviations for the doll group were 9·60 1Q points and 5 months ; for the experimenter group they were 10·01 and 5 months.

Materials. A chair was placed at each side of a square table. There was a black circular baseboard in the centre of the table.

For the practice trials an orange cylindrical tin was placed in the middle of the baseboard. A small white ball was in front of the tin and a small yellow cube to the right of it. Four pictures provided different views of the objects.

Four object arrays were presented in the test trials. Each array contained three objects, identical except for colour. The objects used were candles, bottles, balls and cones. The three objects in each array were arranged in a triangle on the baseboard. Four pictures provided different views of each array. A plastic doll was used as the other observer for the doll condition.

Procedure. Each pupil was tested individually. The child was seated at the table and was shown the three practice objects separately. The experimenter named each object and placed it on the baseboard.

The four pictures were spread out on the table and the experimenter explained that these showed " how the objects look from different positions." The pupil was asked to " choose the picture that matches what you can see." If the child chose incorrectly, the experimenter pointed to the correct one. Whether or not the subject had been correct, the experimenter explained that the picture matched because it showed the ball in front of the tin and the cube at the side of it. The pupil was then asked to choose the picture which corresponded to the other observer's view from each of the other three positions. In the doll condition, the doll was placed near the edge of the table facing the object array. The subject was asked, " Which picture matches what the doll can see ? " In the experimenter condition the experimenter sat in each chair in turn and asked, " Which picture matches what I can see ? "

Whether or not the pupil made the correct choice, the child checked his response by taking the picture to the other observer's position. If the response was incorrect the child tried again until succeeding. The experimenter pointed out the spatial relationships among the objects as seen from each position.

In the test trials the pupil sat in a different place for each of the four object arrays. The order of these positions was randomised for each child. In addition, the order of presentation of each object array was randomised for each child. For each object array the pupil was asked to match a picture to his or her own view and then to the other observer's views. Thus, the child always found his own view first, but the order of the three other views was randomised. The pictures were rearranged for each question. The pupil was not allowed to move from his position to check his response during the test trials.

RESULTS

Responses to the pupils' ' own view ' questions were considered separately from responses relating to the other observer. Own view questions involved matching a picture to the object array whereas the other questions involved matching a picture to the view which the subject attributed to another observer in a position different from his own. The scores for these others are taken as a measure of perspective ability.

Many subjects did not readily match a picture to their own view in the practice trial. But all subjects were able to do this in the test trials.

Each pupil's correct response score and egocentrism score was calculated. The maximum possible score for each of these was 12. The mean correct response score for the doll group was 2·7. For the experimenter group it was 5·2. This difference between the mean scores is significant ($t=3·16$, 28 df, $P<·01$). The mean egocentrism score for the doll group was 5·6 whereas for the experimenter group it was 3·75. This difference is also significant ($t=2·76$, 28 df, $P<·01$).

These results confirm the hypothesis that performance in a perspectives task will be better in the experimenter condition than in the doll condition.

DISCUSSION

A significantly greater number of correct responses and fewer egocentric responses confirmed the hypothesis that young children will perform better in a perspectives task when the experimenter acts as the other observer than when a doll is used. This result suggests that young children are better able to predict the view of another person because a person is accepted as an observer, whereas a doll may be regarded as an inanimate object with no capacity for seeing. It was noted during the experiment that children in the experimenter group tended to look at the experimenter before making their choice of picture whereas children in the doll group often ignored the doll and seemed not to notice that it had been moved to a different position.

The characteristic egocentric response in the three-mountains task is often cited as an illustration of the qualitatively distinct nature of the young child's thought processes in the pre-operational stage. Piaget contends that the structure of the logical processes available at this stage places constraints upon the child's problem-solving capabilities. Like the findings of the perspectives studies of Aebli (1967) and Garner and Plant (1972), the results of the present experiment suggest that certain aspects of Piaget and Inhelder's experimental procedure may actually have produced or increased egocentric responses rather than revealing egocentrism as a fundamental characteristic of the young child's thinking. Thus, the accumulating experimental findings raise questions concerning Piaget's assertion that egocentrism is the main characteristic of the pre-operational stage. Further study of the contexts which diminish or enhance 'egocentric' behaviour may elucidate the problem.

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BOOK REVIEWS

ANDERSON, E. M. (1973). *The Disabled School Child. A Study of Integration in Primary Schools.* London : Methuen, pp. 337, c. £5, p. £2·40.

This book discusses the practicality of educating physically handicapped (disabled) children in ordinary schools. The author is a research officer in the Child Development Research Unit of the University of London and the research on which the book is based was financed by the National Fund for Crippling Diseases.

It opens with a general consideration of the issues at stake and an assessment of the size of the problem. There follows a chapter describing the ' sample ' of 99 junior and infant disabled children and their family backgrounds. The school placement problems facing such children are set forth and sympathetically discussed.

The second section, entitled ' The Children in School,' is in many ways the core of the book. It covers not only the situation of the sample, comparing them with normal ' controls,' but also quotes very interestingly from the literature of the subject and presents the social and emotional factors involved in integration. A final section discusses ' Making Ordinary Schools Special ' and has a particularly useful chapter on arrangements in Scandinavia where integration is the rule.

Throughout, the book is easy to read and well documented. Elaborate statistical treatment is not called for by the material but the facts arrived at are presented in clear tables as well as being fully explained and appraised. There is an admirable lack of bias or exaggeration while at the same time intimate knowledge and sympathy contributes much to the impression made. Miss Anderson's gift for posing searching questions is striking. She looks straight at her subject making no pre-digested assumptions. As a result her answers, when they come, carry weight. Her case histories are not trivial but genuinely illustrative.

Some matters to which she draws critical attention are the insufficient consideration given to parents' views on placement, lack of awareness of the children's social problems by some teachers, and failure by some authorities and schools to make adequate support arrangements. On the other hand, many cases are also instanced where all these matters are attended to, and there seems little doubt that it is quite possible to ' integrate ' even very heavily handicapped children. This is partly due to the qualities of the children themselves whose experience seems to promote a realistic and philosophical attitude to their disabilities, well illustrated by the 5-year-old achondroplasic who asked why she was smaller than her friends. On being told " God made you like that," her response was " Well it was jolly unfair of Him." However, she also spontaneously saw that there were things she could do that others could not—such as being chosen for the coveted role of cat in the pantomime.

On all counts this is, as Professor Tizard says in his foreword, an excellent book, and it is to be hoped that it will be read and acted upon by education officers, teachers, and all who have any connection with the education of disabled children. It is worth its hardback price but can also be obtained in paperback form.

OLIVE C. SAMPSON.

BERRY, J. W., and DASEN, P. R. (Eds.) (1974). *Culture and Cognition : Readings in Cross-Cultural Psychology.* London : Methuen, pp. 466, c.£5·00, p. £2·50.

Simon Biesheuvel, in his foreword to this interesting anthology, observes that " cross-cultural studies are steadily increasing their claim on the attention of psychologists." However, any book that adds to the proliferation of collections has a duty to justify itself if it is to avoid the criticism that it merely adds another item to the latest methodological band-wagon. Berry and Dasen (not with complete accuracy) justify their book as " an attempt to bring together, for the first time, a wide variety of psychological research which is explicitly concerned with cognition in its cultural context " ; but perhaps for readers of this journal the significance of the book is that a higher proportion of the readings have applications for educational policy and practice than one commonly finds in more ' general ' texts on cognition.

The book opens with a brief introduction to history and method in the cross-cultural study of cognition, and is unusual in posing doubts about the methodological soundness of the cross-cultural approach. The arguments for proceedings beyond western, laboratory-oriented research are adequately rehearsed, and some mild self-criticism is offered, based partly upon the view that cross-cultural comparisons can only be valid when they are related to " functionally similar problems." So, back to the debates of the cultural anthropologists in the 30's !

But the book ignores the question of whether the cross-cultural approach can *ever* be logically other than an heuristic technique to illustrate or describe cultural modifications of cognitive processes. The articulations between cultural and societal contexts and physio-psychological events have yet to be demonstrated, and no analytical framework appears in sight to move beyond description to explanation. Berry and Dasen would have strengthened their argument had they referred to, and squarely met, the arguments of, e.g., Robinson (1972) whose critique of the cross-cultural approach as applied to visual illusions is cogent and disquieting.

However, the material collected is well worth having in an accessible form, it is up-to-date and comprehensive (though no paper by Deregowski or Serpell is included), and is uncluttered with trendy jargon.

It is arranged into three parts : (1) Quality and variation of cognitive processes ; (2) Cognitive level and attainment and (3) Cognitive development : Piagetian approaches, and readers of this journal will probably profit most from the second part and rather less from the third, as in these two sections are the most theoretically interesting and research-generating papers.

The 11 papers of Part One include one of Mallory Wober's imaginative papers which suggest how an experimental approach reveals fascinating theoretical and practical problems : a child learns to perceive his world in ways that may emphasise any sense modality. What determines his ' choice ' ? Culture ? His peculiar physio-psychological makeup, or an inter-relationship of both ? Also in this part, Witkin's study of cognitive styles across cultures proposes that " it is a challenge to future social action research to translate . . . (into educational needs) . . . an articulated cognitive style and self-differentiation."

Unfortunately, the perennial problem of individual differences is generally obscured by the cross-cultural approach, and neither in this, nor in the second part of the book, is it more than slightly touched upon.

The six papers of Part Two are of the most immediate and obvious relevance to education, and include a much-too-brief article by Biesheuvel on the nature and measurement of intelligence, and a major theoretical paper by Cole and Bruner which focuses on the practical question of how to transfer the skills the child develops, and has learned via his personal, idiosyncratic experience and his culture, to ' formal ' educational tasks.

Finally, the eight papers of Part Three are a somewhat mixed bag of Piagetian research of varying quality, but the question *is* raised by Piaget and by Dasen that the properties of thinking may be " universal or . . . influenced by cultural factors," and a methodological and research problem has yet to be solved.

The overall impression of the readings is that if cross-cultural studies continue to be predominantly descriptive, the subject is little more than experimental psychology plus waving palm trees, and there is some danger that new cultural differences can become old race differences modified. It is a reflection on the state of the subject, but no criticism of the readings, that they are so resolutely empirical and so rarely analytical and discursive.

LEONARD BLOOM.

BRUNER, J. J. (1974). *Beyond the Information Given.* Hemel Hempstead : Allen and Unwin, pp. xxiv+502, £5·85.

It is a fair assumption that most readers of this *Journal* are working in the educational field, with more interest in applied psychology in that field than in pure psychology. For them Bruner's best known works are *The Process of Education* (1960), *Towards a Theory of Instruction* (1966) and *The Relevance of Education* (1971). It may be salutary or frightening to learn that his first quoted published work in 1939 was on behaviour and learning in rats.

While Bruner is author or co-author of the 27 articles here, Jeremy Anglin, a sometime junior colleague at Harvard, has chosen, grouped and presented them. His aim has been to show that, although there is great diversity of subject matter yet there is a unity stemming from Bruner's abiding interest in " the process of knowing " so that information leads on to insight, understanding and competence—hence the title. It was originally used in one of a collection of papers published in 1957 which had developed the theme of Spearman's noegenesis (only the ' oldies" will recognise a peculiar misprint here), Bartlett's ' Thinking ' and William James's masterly simplicity in the phrase, " Hello ! Thingumbob again," like the "Aha " experience. From here, generic coding, set and extrapolation were explored and better understood.

Cognition, development and education make up the unified whole in five sections : Perception, Thought, Skill in Infancy, Representation in Childhood, and Education. There is a mixture of theoretical and research papers. The section on perception credits Bruner with the New Look Perception perhaps exemplified by the analysis-by-synthesis model where the organising factors are Values and Needs. There is an initial hypothesis substantiated by further properties being incorporated in the concept. Just how we organise and categorise remains a problem. The final theory of perception has to explain individual differences in the perceptual process other than by attributing them to random error. It must stand up to both clinical and laboratory testing. Thus, great need and wish-fulfilment were both acceptable as initial hypotheses but had to be modified against other properties such a predictive expectancy and how other factors would be organised—compare the pre-perception of William James. Those who resist the New Look may care to ponder on the utter barrenness of the earlier perceptual work, done on well-known illusions using iterative processes, simplistic group dynamics, deadly dull statistics, teutonic firmness and totally discounting the perceiver. From the loathèd tedium thereof, we have been delivered. This section will repay study by those interested in current linguistic problems where redundancy in language and the use of generic coding systems are crucial.

The second section is entitled ' Thought.' It discusses how concepts are arrived at. Factors must be externalised to be examined. Wallas's analysis of thinking is only partially accepted because more than direct experience is involved. The vogue for illuminative evaluation could be supported and clarified by the discussion in this section, especially regarding the problem of recurrent regularities in the environment which cannot be comprehended owing to their complexity, or a serial amount beyond the experimenter's/observer's memory capacity. This section works up to a plea, implicit in the title, for greater utility in learning and a move to probable reconstructions of other events. After the psychology of learning comes the psychology of problem solving.

The third section, on ' Skill in Infancy ' apologises for discussing such simple skills, but justifies this by claiming that there is little knowledge of skill development other than related to norms, when it should be to description of behaviour. Yet Bruner is not strictly behaviouristic/associationist in that, intention, feedback of results against that intention, and structure, which involves a hierarchical set of rules, are all essential in his consideration of a skill. There is a parallel between skilled behaviour and language production. Just as the execution of a skill is constructed to satisfy a task requirement and the end product compared with the intention, so a series of operations is what leads to the solving of a problem. At the infant level play to achieve mastery, imitation and modelling successfully conducted lead to competence. How there comes to be a reorganisation of the constituent parts once success has been achieved is not explained. The section on representation in childhood deals primarily with enactive, iconic and symbolic representation and it leads on through mental growth, which occurs through cultural agents, of which the school is one, to the final section on Education. It has all been a lead up to the theme of active participation by the learner, where there are hypotheses which can be analysed, re-synthesised, and which lead to a healthy discussion with student and teacher, which is the essence of learning.

The Theory of Instruction is now worked out in some detail. The role of the teacher is to help the student tailor the information given to his current ability to comprehend it. Implicit here is the over-quoted and often wrongly quoted hypothesis that, " any subject can be taught effectively in some intellectually honest form to any child at any stage of development." It is backed up by examples from mathematics and from what might be called social studies. Pundits in the area of curriculum development, which has now become a major industry, may find here a satisfying theoretical framework.

Finally, there is what must be one of his best known papers, " Education as Social Invention," where he puts meaning into Dewey's socialisation aspect of schooling, explains skills as being sets of sub-skills building up to great complexity, justifies the spiral curriculum, and some would say, abdicates his responsibility as a psychologist by forcing society to choose from a range of alternatives. There is a hint that Tawney was right in suggesting that education keeps mankind just a little ahead of catastrophe.

At a time when education and its value to the community, set against its soaring costs, are being called in question, and when people, especially educational psychologists, crave the security of reference to authority (think of the mileage they got from Terman !) what could be better than Bruner, who also believes in Piaget, giving his formidable support.

J. G. MORRIS.

BUTCHER, H. J., and PONT, H. B. (Eds.) (1973). *Educational Research in Britain*—3. London : University of London Press, pp. 420, £4·60.

The third volume of the series inaugurated in 1968 by Butcher and Pont has made a welcome appearance. It contains 17 chapters dealing with many of the fields in which educational research has been conducted during the previous three years and, as usual, the contributors have been well chosen to give well-informed summaries of the work in their areas, which cover the range from pre-school to higher education.

It was a happy idea to invite a visitor from Canada to write the chapter on some aspects of the development of British research in education. His verdict that the development was slow must be accepted, but it is interesting to note his opinion that this reluctance to pursue a faster pace, based, as it was, mainly on highly critical attitudes among teachers, research workers, philosophers and the British public, has had valuable consequences for educational research. The climate has indeed changed greatly in the past 10 to 15 years, with grants of the order of £100,000 now being made for particular projects, but the total expenditure including that on development is still under 0·2 per cent of the total public expenditure on education. However, this is only one problem and perhaps not the main one ; others arise in the training and supervision of research workers and in the need for more fundamental thinking about the concepts used in educational research.

To those unfamiliar with the preceding volumes in this series it must be made clear that the chapters are not merely catalogues of published work. The authors, being themselves engaged in the appropriate fields, are usually able to add to the published material further information about the progress of various projects, to make comparisons, to comment on apparent discrepancies in the findings, and to make judgments. One contributor points out where well-known authors have, in his opinion, drawn the wrong conclusions from the data included in their reports ; another describes some studies as ' poor,' follows this up by referring to another as ' very poor,' and finally criticises severely and justifiably those who analyse data ' just because they are there.'

In the introduction reference is made to developing areas—the handicapped child, organisation theory, and higher or tertiary education—each of these topics being given a chapter. Some of the contributors admit that there has been little work so far in their fields, but what they have to report shows that a start has been made. Others point to the need for improved communication between researchers in particular areas (this applies especially to research on reading) and almost all make comments which throw a fresh and sometimes unexpected light on the problems to be faced in their fields. Amongst such a mass of material there are naturally some points of view with which the reader will disagree, and one or two statements of ' fact ' which are incorrect, but the latter are of a minor nature.

To add to the value of the book there is an extensive bibliography, divided into sections to correspond to the chapters. Altogether it is a book well worthy of study by those engaged on, or interested in, educational research.

DAVID A. WALKER.

CENTRE FOR EDUCATIONAL RESEARCH AND INNOVATION (1973). *Case Studies of Educational Innovation.* Volume I—At the Central Level, pp. 615, £3·70. Volume II—At the Regional Level, pp. 443 £3·00. Volume III—At the School Level, pp. 326 £2·00. Volume IV—Strategies for Innovation in Education, pp. 296 £2·84. Paris : Organisation for Economic Co-operation and Development.

The study reported in these four substantial volumes was conceived at a CERI conference on the management of innovation in education, held in Cambridge in 1969. It consists of 17 case studies of innovation at the three different levels of the educational system indicated in the titles of the first three volumes. The rationale underlying this sub-division, we are informed, " was the assumption that the influence of various forces inside and outside the educational system would operate at one or more of these levels." Few of us will be disposed to quarrel with that.

The first volume includes accounts of seven central institutions for educational innovation and gets off to a resounding start with a highly perceptive analysis of our own Schools Council by Professor John Nisbet. One hopes that arrangements will be made for its separate publication in this country.

The other organisations that are treated in this section are the Ontario Institute for Studies in Education, Canada (Francis S. Chase) ; the National Council for Innovation in Education, Norway (Sixten Marklund and Eskil Bjørklund) ; The New Jersey Administration, USA (Michael D. Usdan) ; the National Board of Education, Sewden (Oddvar Vormeland) ; the Bavarian State Institute for Educational Research and Planning, Germany (F. E. Weinert and Heribert Simons) ; and Research for Better Schools Inc., USA (Leon Ovsiew).

The second volume comprises case studies of five ' innovative regions,' selected, we are told, not because they are necessarily the most innovative parts of their countries, but because each, over a period, has manifested a consistent commitment to change.

This country is represented by Leicestershire (Brian Holmes) and Devon (Richard Carlson and Brian Holmes). The other three entrants are Wetzlar, Hesse, Germany (Helga Metzner and Gunther Probst) ; York County, Ontario, Canada (Jan Loubser, Herbert Spiers and Carolyn Moody) ; and Malmö, Sweden (Wolfgang Teschner).

The criteria for the selection of the five schools that are treated in the third volume are not made explicit. A plausible inference is that a wide geographical distribution was sought and examples chosen of schools that could be classified as innovative in relation to the system of which they form a part.

The chosen schools are Countesthorpe College, United Kingdom (Gerald Bernbaum) ; The Experimental Gymnasium, Oslo, Norway (Trong Hauge) ; Thornlea School, Ontario, Canada (Michael Fullan) ; Rødovre School, Denmark (Tom Ploug-Olsen) ; and Tapiolan School, Finland (Lyyli Virtanen).

In the final volume, written by Per Dalin of the CERI staff, who developed and supervised the whole project, an attempt is made to synthesise the diverse findings of the case studies and to relate them to a theoretical framework, developed eclectically from the work of previous model constructors in this field, but resting most heavily on the formations of Bennis, Benne and Chin.

In delivering a verdict on this attempt one is reminded of Dr. Samuel's observations on women preaching and dogs standing on their hind legs. It is not surprising that this final volume is unsatisfactory but remarkable that it should ever have been envisaged in this form. The chosen theoretical framework imposes severe and unnecessary constraints on the analysis of the abundant and complex data that the case studies have yielded. If the author had been content with a natural history approach instead of seeking to make a contribution towards the development of a sophisticated theory, the exercise would have been more profitable.

The disappointing outcome of the final analysis should not be allowed to detract from the value of this collection of case studies, nor indeed from that of the insights that the concluding volume itself provides.

ALFRED YATES.

COLE, M., and SCRIBNER, S. (1974). *Culture and Thought : A Psychological Introduction.* New York : Wiley, pp. x+227, c. £5, p. £2·40.

The authors, both of whom have conducted extensive psychological studies on hitherto neglected populations, present their own and others' findings in an attempt to elucidate the relationship between culture and cognition and thus to bridge the gap between approaches belonging traditionally to anthropology and psychology. The book is written in a very readable style ; at times one even feels that the authors have bent too far backwards to smooth the way by making such trivial statements as that Homer was a 'a great epic poet' whose works are among 'great classics of world literature.'

Of the book's eight chapters, five are reviews of selected recent findings, whilst the other three present introductory and concluding discussions and a historical resumé.

This resumé is the weakest chapter of the book. In it various approaches and grand theoretical schemata are very briefly examined and interspersed with short quotations from apposite works. The critical acumen, it appears, has not here been used as keenly as when dealing with the experimental findings in other chapters of the book. Thus, some authors (e.g., Levy-Bruhl) are criticised for basing their theories upon inadequate data whilst in discussion of work of some others (e.g., of the Marxist school) the nature of the data is not even described. Complete exclusion of work primarily concerned with, or associated with, IQ measurement from this section (indeed from the entire volume) without even a key reference or two in the list of further reading is also surprising, as is the complete omission of any reference to Jensen's work with its implications for the organisation of cognitive processes. Surely such work needs must be thoroughly, and this means cross-culturally, examined.

In contrast, the remaining chapters (those dealing with culture and perception, culture and conceptual process, culture, learning and memory, and culture and problem solving) can be commended to a layman, an undergraduate, and even a graduate student, in search of a fruitful and exciting field of research within the cross-cultural field. The material is well chosen here and findings which the authors, in the light of their judgment, have excluded and which might by some be thought of relevance to the issues discussed can easily be found in the reference list of primary sources. (Such is the case, for example, with Hochberg's observations of recognition of pictures by a child with minimal pictorial exposure.)

Inevitably there are some minor slips which a thorough and curious reader can easily remedy. It is not true, for example, to imply that Segall, Campbell and Herskovits worked with only two illusion figures ; it is difficult to relate, owing to a typographical error, Fig. 4–5 to the relevant text. One hopes that these and others of like ilk will be remedied in the next edition.

J. DEREGOWSKI.

CURLE. A. (1973). *Education for Liberation.* London : Tavistock, pp. vii+144, £2·50.

Professor Curle has worked in over 20 different countries of the Third World. His book attempts to set out what sort of educational practice would contribute to the development of a "just and non-violent" society. His thesis is that "education enslaves : men and women become free by their own efforts." At present "education, as it is mostly practised, does not so much free men from ignorance, tradition and civility, as fetter them to the values and aspirations of the middle class which many of them are unlikely to join." Specifically, in developing countries "imported education was attuned to the competitive and materialistic ideologies of the rich nations." The products of such education "have been alienated by their education from their culture (and) they scorn their unlettered brethren in the village."

Professor Curle uses his first two chapters to spell out how education equips (or fails to equip) with skills in the service of "the system,", i.e., the network of "political economic and industrial organisations of the powerful whose power enables them to take advantage of the powerless." He asserts that "when knowledge becomes a commodity . . . society becomes professionalized, unequal and unjust." Chapter 3 sets out an "educational system for a truly peaceful society," and how it might be achieved. Curle contends that the basic task of the idealised school "would be to help . . . students to come to terms with their own nature." The teachers would be chosen "in mature years . . . by a commission skilled in identifying wisdom, patience, sincerity, warmth and inner coherence . . . Being a teacher would be the highest honour the community could confer." In Curle's educational Utopia schools are distinguished from institutes for training in specific useful skills. For students "school and training at an institute might be concurrent or sequential or alternating" depending on the students' level of awareness at any given time. Competitive pressures would be removed because jobs would not differ in status or financial reward.

In chapters 4–8 Curle returns to the immediate future and describes the characteristics of teachers which he regards as desirable, the proper aims of education in the context of the present, the desirable relationship of teacher with student and how to bridge the chasm between now and Curle's Utopia of chapter 3. A key concept in the whole book which is particularly prominent in these chapters is that of awareness. Curle quotes with approval Richard Burnett who writes "Development . . . is the awakening of awareness . . . a society will develop only as the individuals in it develop their true potential and are prepared to give themselves to social efforts to which they feel personally related and in which they have some rights to control their personal destinies." Awareness is primarily of self, leading to an awareness of others. Curle developed his ideas about awareness after he had "read widely in Oriental Mysticism travelled for some time in the Middle East and . . . studied under Ouspensky."

Chapter 9 contains Curle's ideas about "education and development in poor countries," arguing for localised form and content of education in different countries, which education should assist development towards a state in which four aims are met, safety of individuals, material sufficiency, satisfaction with life and the availability of intellectual, emotional, social and spiritual stimulus. The book ends with a short chapter on the nature of the liberated state and an appendix comparing and contrasting his views with those of B. F. Skinner, whose *Beyond Freedom and Dignity* was published after the first draft of Curle's book was produced.

I admire Professor Curle, I shared many of his values in so far as I feel clear about them, and I enjoyed his book. There are two major points I wish to mention to qualify my enthusiasm for the book. Firstly, although the book is entitled *Education for Liberation*, what Curle has written appears to be a book about the educational consequences which may flow from "a peaceful world community" which seems to exist as a setting for his Utopian educational system. Secondly, the concept of awareness is not sufficiently spelt out to be convincing as the cornerstone of an educational system, and if left indefinite, may lead to a state of affairs scarcely better than the present one. Being called "unaware" could just be another sort of pejorative label without any agreed referent.

K. PEASE.

ELITHORN, A., and JONES, D. (Eds.) (1973). *Artificial and Human Thinking.* Amsterdam : Elsevier, pp. xiv+385, Dfl. 32.

The 30 short contributions which this book contains were originally delivered in 1971 at the NATO symposium on human thinking—computer techniques for its evaluation. As might be expected from an international conference of this kind there is much here of interest and of value. The area over which the various authors range is much wider than that generally connoted by the term 'artificial intelligence.' with the consequence that computer language and logical formulae are kept to a minimum and can generally be easily followed by the non-specialist.

The editors have arranged the book in five sections, each containing five or more articles plus an added introduction to each section. Wisely, they have not attempted to reproduce verbatim discussion and the result of their labour is more readable than it might otherwise have been, and pleasantly illustrated with Tenniel's sketches from Lewis Carroll's *Through the Looking Glass* " . . . to present symbolically the interaction of logic and fantasy which characterises creative human thinking."

In the section dealing more specifically with 'artificial intelligence,' Bernard Meltzer raises the crucial question : " Can induction be programmed ? " and cites in answer examples of successful induction programmes. His arguments are interesting and ingenious but one is left with the uneasy feeling that all this, at another level, is perhaps reducible to *deduction.* The requirement of a 'suitable logical language' in which some fact or conjunction of facts, can be expressed, itself raises difficult problems which are highlighted in Ranan Banerji's thoughtful contribution on 'concepts.' Something more than redundancy seems to be lost when we pin down even the apparently simplest verbally expressed 'fact' to a logical formula. Surely the Leibnitzean dream of a logically pure language was shattered when Wittgenstein rejected his own earlier work in the Tractatus ?

There is a healthy scepticism in many of the articles, and an absence of implicit philosophical dogma. Only rarely are there traces of the reductionism to which some who work closely with computers are prone ! " . . . the everyday world inhabited by human robots." It is difficult to see what an author is trying to convey when he says " The robot lives *in* time." Why italicise 'in' when the contradiction of the statement is self-contradictory ?

In the section on games some attention is paid to possible chess-playing machines. M. R. B. Clarke tells us that the two strongest chess playing programmes so far produced play at about the level of the 500th best player in Britain. This figure is surely a guess, and more than one member of the symposium echoes the view of Cooper and Elithorn that " computer programmes sometimes seem very clever but this cleverness is often inbuilt human ingenuity." Do we really play against the programme, or against its writer ? The game of halma is far more amenable to reduction to a finite set of alogrithms, and Elithorn and Telford's work on this game reveals interesting interactions between different computer programmes and the ability of subjects.

Eiferman contributes a useful summary of his extensive work on children's games, with only a cursory mention of computers in the last paragraph. Like many of the articles, this is concerned with interesting psychological work on human thinking, broadly interpreted, with little reference to the 'artificial' side. There is some good experimental work reported, into which the computer enters only as a data processor.

The mention of selected names in this review reflects nothing more than the writer's own interests. The book as a whole constitutes an excellent compendium of readings in modern approaches to human thinking. Most of it will be intelligible to undergraduates and non-specialists in the field.

J. K. CLARKSON.

EYSENCK, H. J., and WILSON, G. D. (1973). *The Experimental Study of Freudian Theories.* London : Methuen, pp.xv+405, £4·90.

This is a collection of 21 experimental studies of deductions from Freudian theories by various workers, and is interesting as such. Each paper reprinted has a comment by the authors, and there is a foreword, an introduction and an epilogue.

To review such a book in a short space is a difficult task, and no doubt much could be said in its favour. The authors are extremely able, and have presented a very well organised and clearly written work, from their point of view, but there are, inevitably, many reservations about it, and some of these could be mentioned. For instance, one has the impression that the behaviourist learning theory approach will always be preferred if it and the Freudian theory might apply equally well in a given case. The behaviourist learning theory, however, never appears to give a convincing account of human or animal psycho-dynamics and experience. The more it is stressed the more will dissentients from it be activated.

An interesting point arises in connection with S. G. B. Eysenck's study of the relationship between neurosis and psychosis (pp. 342ff). She infers, it seems, that because in the psychoanalytic theory the neuroses and psychoses are believed to correspond to successively deeper levels of regression, there is a continuum from neurosis to psychosis. An experimental study suggests that there is not a continuum, and so the Freudian theory is said to be rejected. This, however, seems to be an inadequate view. Deeper and deeper regressions would correspond to changes from one to another kind of neurosis, and beyond a certain level, there would be a change to psychoses, which are well-known to be different from neuroses in many important ways. The changes from one neurosis to another, and to psychosis, and from one psychosis to another, can be understood in psychoanalytic terms. The Freudian theory would suggest that the discontinuity is more important than the continuity, which is insignificant in comparison, and the experiment actually supports the Freudian theory.

Omitting many points of difficulty and also of interest, H. J. Eysenck's study of the success of psychotherapy might be mentioned. It appears that only 44 per cent of patients in psychoanalysis improve or are cured, whereas for eclectic psychotherapy the figure is 64 per cent, and for those under general medical practitioners it is 72 per cent. Surely this does not show, as often assumed, that psychoanalysis is ineffective or even harmful, while eclectic psychotherapy is moderately good and general medical treatment is the best. It shows who has the greatest understanding of patients and knows best when they are truly well. Psychoanalysts, who have the greatest understanding are least inclined to agree that patients are better or well when they know that they are not ; eclectics, who have less clear understanding, are more inclined to agree that patients are better, and general practitioners, who understand least, are quite ready to believe that patients are better or well. Also, spontaneous ' recovery ' in the sense of a swing away from illness, temporary or otherwise, would be predicted for certain patients by psychoanalysis, while difficult recovery or non-recovery would be predicted for others.

One must comment on the last few pages of the book. Taking up the idea expressed by Ricoeur, that what is important to the analyst is how the environment is believed to be or is experienced by the subject, so that his study is about the meanings of events to that subject, Eysenck and Wilson say that they would have no concern with such a view, since it would lead to the relinquishment of orthodox science and to solipsism.

Surely one of the points brought out most clearly by recent experimental psychology is that we all live to a greater or lesser extent in our own ' behavioural environments ' (Koffka), which differ from the ' real environments ' in certain ways, and Eysenck and Wilson are no exceptions. This does not lead to solipsism, which is a philosophical theory and is quite another matter. Scientific psychology has to do with the behavioural environment and, since some of the greatest problems with which recent experimental and social psychology have been concerned lay in this direction, there are good reasons to be suspicious of the behaviourist learning theory. The psychoanalyst is concerned very much with the way patients experienced the realities with which they were confronted in their lives, how these differed from those realities, and how those experiences affect them in the here and now.

R. W. PICKFORD.

FORREST, A., RITSON, B., and ZEALLEY, A. (Eds.) (1973). *New Perspectives in Mental Handicap.* Edinburgh and London: Churchill Livingstone, pp. 235, £2·50.

The preface announces that this is a book for students following courses in medicine, psychology, social work, nursing, psychiatry and education. It is the hope of the editors that it will also be of interest to other personnel working in the field of mental handicap. One of the book's main themes is that the rigid 'medical model' approach to mental deficiency should be relinquished in favour of a bio-social perspective.

In general, the book probably meets the needs of its stated readership, although it seems that the content of the first six chapters is dealt with in other available texts at least equally well. It is probably in the subsequent seven chapters that the book illustrates the new perspectives most effectively, although it must be a disappointment to many that there is no specific contribution from a clinical psychologist when the latter profession has made such extensive contributions within the field of mental deficiency, both by research and practice. References to operant procedures occur from time to time in the chapter on the nurse's contribution and in that on subcultural handicap, but it seems a pity that the topic of assessment has to be dealt with relatively inadequately by Ritson and in equally slight manner by Brown when illustrations in the book itself show a clinical psychologist running a social education class and further suggest her role in operant conditioning procedures and token economies.

In the same way there is a large area of motor and sensory motor development in training which the book, for all its merits, has failed totally to incorporate. Perhaps because part of the writing in this area is by a paediatrician and an educational psychologist along with psychiatrists, a preoccupation with the problems of assessment and remediation with children predominate in spite of the fact that the majority of subnormal patients are adults. It seems a pity that, where intelligence is discussed, for example, we should be reminded that IQ equals $\frac{\text{MA}}{\text{CA}} \times 100$ without any discussion of deviation IQs, the relevance of other test data and, in Priestley's chapter, some more objective scrutiny than he gives of the role of tests like the Frostig and the ITPA.

Ritson's initial chapter on 'The Concept of Mental Handicap' necessarily ranges widely, dealing with prevalence, intelligence and diagnosis. It is also the chapter which first gives evidence of relatively inaccurate proof reading with irritating repetitions of error, both in the text and in the references, where Gunzburg is persistently wrongly spelt with an 'e' and Heber with an 'o.' Chapter 8 has no chapter title and Cri-du-Chat Syndrome is attributed to absence of part of chromosome 5 on page 60, but to deletion of the short arm of chromosome 4 on page 77. The reader is also told that "a recent study of marriages between mildly retarded people showed a surprising capacity for mutual support and social competence" (p. 8) but no reference is given.

The chapter on the role of the paediatrician by J. K. Brown is sound and is one of the few chapters to recognise the value of sensory motor training with very young children. Chapters 3 and 4 by Zealley and Skinner on clinical syndromes and the genetics of mental handicap turn out to be mandatory material for any general text and are clearly written but suffer from overlap of material. Consequently, there is some repetition in chapter 4 of what has been presented in part in chapter 3.

Chapters 5, 6 and 7, by Forrest and Ritson, respectively, on subcultural handicap, childhood psychosis and outline services for the handicapped are, whilst somewhat derivative, fairly straightforward, factual and sensible pieces of writing.

Chapter 8 by Hegarty and Sutherland on the role of the nurse, could be made even better by further elaboration of the relationship between officers and nurses and between nurses and other staff in the caring team. This chapter and the next, by T. D. Hunter, on changing patterns of organisation and management, however, present a lot of enlightened commonsense even if the latter's style is rather turgid and allusive as compared to the chapters on each side of it. Nevertheless, Hunter's statement is forceful and thoughtful and at a significantly greater level of abstraction than that found in the other chapters of the book.

Priestley's chapter on educating the mentally handicapped is a model of direct, simple and clear style. No teacher or instructor reading this chapter could fail to establish a general conspectus which would guide his or her day-to-day procedures with subnormal subjects. Time and again this reviewer found himself nodding and putting approval ticks in the margin. However, there were times when it was felt that the chapter would benefit from some validation from the experimental literature for many of the points made, and when occasional queries rose in the mind of the reviewer, as for example, when the writer suggests that certain " basic concepts and skills be taught directly " (p. 182), without making it entirely clear which of these concepts and skills were basic and for what reason.

The final chapters by Jellinek, Forrest and Ritson on social work in mental handicap, by Crombie on the contribution of voluntary societies and by Ritson on prevention in the field of mental handicap are relevant though fairly short contributions in the setting of a book which undoubtedly meets its declared specification. The minor criticisms enunciated above are more than adequately compensated for by a generally enlightened and humane over-view of the field which fairly represents the best contemporary thinking in almost all the disciplines involved. It appears to be just right for students who need something more than lecture notes or initial primers but are reluctant to wade through major tests in their totality, and at £2·50 it is fairly good value for money.

D. F. CLARK.

FREEHILL, M. F. (Ed.) (1974). *Disturbed and Troubled Children.* Chichester : J. Wiley, pp. 216, £6·65.

The stated purpose of this book is to acquaint teachers, community workers, workers in child psychiatry and psychology and parents with the problems of disturbed children and the ways in which these problems are handled in a range of circumstances.

There is an introductory chapter setting the scene and giving a brief examination of theories and special concerns which influence modern practice. The rest of the book consists of case studies, presenting a variety of problems ranging from mild to severe, from a variety of countries and economic-cultural backgrounds. The cases also cover a variety of treatment settings and staff backgrounds. Most mental health workers choose a guiding model but are aware of and incorporate others under special circumstances for particular purposes. With one exception it is relatively difficult to connect a case description with an author's professional speciality. Each case study is prefaced by the editor's introduction presenting the case and describing some of the current theories and research findings.

There are cases where the approach is psycho-dynamic and others where the main form of treatment has been through behaviour modification. The importance of sociological factors is not neglected and there is an interesting description of how Project Catch-up is used to help a disadvantaged child.

The cases described in the book are treated in school, clinic, hospital and residential, centres. The book touches on a variety of treatment methodologies, individual family and group counselling, as well as remedial education in several patterns.

It seems to me that this book admirably fulfils its purpose and will be invaluable to those involved in work with disturbed children. Unlike so many books, where diagnosis or more rarely an explicit prescription was as far as students were taken, in this book the authors treat assessment as a continuous process, an integrated part of working with the client. Theory and practice are related and an interest and involvement with disturbed children are aroused. A comprehensive list of references and related reading is given at the end of each chapter for those who wish to pursue further study.

Although this is an American publication and occasionally the terms or norms used are not immediately familiar, the problems described are of universal interest and relevance.

SHEILA C. CUMMING.

FURTH, H. G., and WACHS, H. (1974). *Thinking Goes to School: Piaget's Theory in Practice.* London : Oxford U.P., £5·25.

Professor Hans G. Furth, a psychologist, and Dr. Harry Wachs, an optometrician, report a small scale project which they directed in single first and second grade classes of a school in Charleston, West Virginia. The project offered Dr. Wachs an opportunity to extend into the classroom clinical techniques which he had used in attempts to assist poor readers referred to the Pennsylvania Vision Institute. It offered Dr. Furth an opportunity to test the practicalities of suggestions which he had put forward in his book *Piaget for Teachers* (1970), which attempted to relate to parents and teachers the classroom implications of Piaget's theory. The authors summarise the book as "... a description of how to structure a first or second grade classroom to bring about an atmosphere for thinking."

The opening chapters present a lucid introduction to Piaget's theory, a description of the project, its aims and organisation, together with a rationale for 'Schools for Thinking,' which are defined as "... thinking environments ... the term we use for what we hope will be the trend of the future in education." The bulk of the book is given to descriptions of activities ('games') which, claim the authors, develop thinking strategies applicable to the academic subjects encountered by children in the grades in question. The final chapter assesses the project and its implications.

It is difficult for readers to assess the effectiveness of the activities which lie at the heart of the study, as no quantitative results are presented. The project, originally planned to run for four years, was discontinued after a year-and-a-half, as co-operation was not strong enough from those involved in the project, there were difficulties with resource support, and it seems that there was some pressure for evidence of early results. One presumes that there was some alarm at the authors' insistence that traditional school subjects, reading for instance, should not be taught until children were judged to possess the prerequisite skills.

Teachers of infants in British schools will probably find little that is unfamiliar in the curriculum practice suggested by the authors in the early part of the book. Few, however, would consider Piaget's theory as the root of this practice, even though his ideas lend powerful support. Teachers may be more interested in the compendium of games outlined in the body of the text. The classification of some of the games is a matter of debate, as is some of the labelling. Nevertheless, many are novel and ingenious, may give new ideas to teachers, and will certainly appeal to children.

The least satisfactory aspect of the book is the authors' extensive use of 'thinking' which is stretched to cover almost every instance of conscious activity. One reads on with increasing impatience for a precise definition of thinking and reaches the end of the book feeling the need for a clearer articulation of the nature and role of perception, cognition, language and operativity in the process of thinking. At the same time, one is left with the impression that, although the games involve thinking and will probably extend children at some stage or another, many of them bear only marginally on schooling. Furthermore, little is provided to outline the sequence of progression as children master individual games or the activities as a whole. In this case, the less informed reader faces the problem of deciding how to relate the activities and associated thinking demands to the model of development associated with Piaget, and to the logical operations which are thought to have been involved.

It is unfortunate that so many rely on books such as *Thinking Goes to School* for details of Piaget's theory and its relevance for education. Piaget's own writings are often complex and difficult to understand and details of the relationship between his theory and classroom practice are contentious. Certainly, Piaget's contributions have immense implications for education. The claims which Furth and Wachs make for Piaget's theory often read like statements of faith rather than forceful support for child-centred education built around a developmental framework.

TERRY DOLAN.

GROUP FOR THE ADVANCEMENT OF PSYCHIATRY (1974). *Normal Adolescence.* London : Granada, pp. 121, £3.

This is a short and unbalanced book, whose title does not accurately represent its contents. It has been prepared as a report by a committee of the Group for the Advancement of Psychiatry (GAP), and it has no individual author or editor. As far as it is possible to determine, the committee consisted entirely of psychiatrists, although acknowledgment is made of help from Professor La Barre, Professor of Anthropology at Duke University.

The committee make it clear that three important considerations have influenced the orientation of the report. In the first place the committee have employed the concepts and insights of psychoanalytic psychology, as validated by their own clinical and non-clinical observations and experience. This they see as the most comprehensive and valuable body of theory for the understanding of human development. Secondly, the committee acknowledge that while they have attempted to describe normal adolescence, their clinical bias may have " somewhat distorted their view of normality." Thirdly, they take the view that adolescent development takes place within a given cultural context, and that it is probable, therefore, that the report "bears the imprint and bias of our particular culture."

There is no doubt that these are reasonable warnings for any reader to bear in mind. However, there are additional features which the committee do not mention, one of the most striking being the lack of balance between the chapters. While Chapters 1 and 2 are extremely short and deal, respectively, with the biology of adolescence and cultural factors, Chapter 3 takes up almost half the book, and is devoted to a relatively broad-minded account of psychoanalytic theory as it applies to adolescence. This is well done, and is undoubtedly the most valuable contribution the book has to make, but it is a great pity that no mention at all is made of other viewpoints. In particular, since the book is most likely to be read primarily by psychiatrists in training, consideration should at least have been given to role theory, to Erikson's concept of identity diffusion, and to some of the more recent empirical evidence relating to the notion of ' storm and stress.'

The book continues with an extremely short chapter which has an interesting sounding title, " The dynamics of adult responses to adolescence," but which is in reality a disappointing mixture of clinical anecdote and rather obvious statements outlining some of the more common defence mechanisms employed by parents. Finally, an appendix has been tacked on, covering the endocrinology, physiology and anatomy of puberty. Again this is too short to be of much use to anyone, except perhaps to candidates who wish to have a quick look at ' adolescence ' the night before an examination.

There is no doubt that from a psychologist's point of view this is a disappointing book. A smattering of anthropology and physiology combined with a brief psychoanalytic account is hardly sufficient for a book entitled *Normal Adolescence*, more especially when it contains very little reference to the literature. In the introduction Dr. John Evans writes : " This book has much to offer. As a brief introduction to normal adolescence it is unlikely to be superseded for many years to come." This reviewer hopes that it will be superseded at the earliest possible opportunity.

JOHN COLEMAN.

HOUGHTON, V., and RICHARDSON, K. (Eds.) (1974). *Recurrent Education: A Plea for Lifelong Education.* London: Ward Lock International, pp.xix+137, c. £2·50, p. £1·40.

There is some danger that ' recurrent education ' in its various forms will be accepted as a panacea. Politically it may look as attractive today as proposals to reorganise secondary education along comprehensive lines appeared to be some 30 years ago. Then reorganisation was intended to provide secondary education for all, to increase equality of opportunity, to reduce class differences and to meet manpower needs. Left wing politicians advocated it. Sociologists supported it. Recent accumulating evidence suggests that reorganised systems of secondary education still favour the favoured. Truancy rates and unrest in the universities have raised doubts about the wisdom of extending the period of compulsory attendance and expanding universities to meet demand. Today governments may see recurrent education as an attractive alternative to previous policies. Unless as a policy it is subjected to critical analysis it may turn out to be no more effective than previous panaceas.

Unfortunately, the editors and authors in the book, dedicated to the memory of John Dewey, do not offer such an analysis. Collectively, they overtly plead for lifelong learning conceived, presumably, in agreed terms. Their technique is to dismiss, briefly and categorically, anything which smacks of education as a " terminal apprenticeship for a working life " and quote in support of their own very general propositions, Dewey, Illich, Freire, and remarks from innumerable other authorities such as Popper, Kuhn, Bernstein, Bruner, Rawls, *et al.*, without apparently recognising the consequent internal contradictions in their arguments.

The main thrust of their case is clear, however. The traditional " obsolescent front-end model of education " is rejected on the grounds that it reduces the demand for educational services after the age of 25, it " actively militates against human adaptability," and it constrains rather than promotes social change. Thus, selective systems of education based upon a competitive ethic and the use of intelligence tests maintain a hierarchy of privilege. The view that " knowledge is structured and possesses a validity which is independent of the knower " justifies subject-centred curricula and places the teacher in a position of authority from which he passes on " to each generation the intellectual and practical achievements of previous generations." Pupils are thereby conditioned to accept their place and learning is fostered " more by accident than design." In response to social change in post-industrial countries adult education courses proliferate irrationally. Such views are, of course, much more popular now than they were and the substantial arguments which lie behind the vitriolic attacks should be taken seriously.

Certainly the authors expect readers to take their alternatives seriously. These are that recurrent education should be lifelong process of learning. It should promote adaptability by being learner-centred and since knowledge is not given but " constructed within the social process " by interaction the teacher should not be a ' purveyor ' but rather a ' facilitator.' It follows that education should not be structured, or institutionalised, but should be available throughout a person's life, accessable to all and relevant. To be relevant education must produce autonomous learners who are free and able to make up their own minds. The content of education will emerge from the cultural responses of human groups in their particular problem situations. Control will be shared by participants in the process of learning.

So far so good. As a lifelong admirer of Dewey, I find myself agreeing to some extent with the authors' general case. Where I part company with them is when they try to justify their own position by touching on arguments drawn from the philosophy of science and biological theories. These lack rigour and the conclusions drawn from them depend too much on the case the authors wish to make to be convincing. For example, Popper's attack on historicism in the natural sciences has been widely accepted, but to conclude from his analysis, as the authors seem inclined to do, that scientific knowledge and professional expertise, their language and status are socially determined in an arbitrary manner is to miss the point of the argument. Again, to concede that there are genetic differences between individuals and yet claim, in effect, that they cannot be measured depends more on the authors' vitriolic rejection of intelligence tests and their belief that " no relationship of any kind whatsoever can be established " between school grades, and " job performance as assessed by colleagues " than on a careful sifting of conflicting theories and evidence in the nature-nurture controversy. Personally, I have found among my colleagues professors, for whom I have the greatest respect, who won open scholarships at school.

I also part company when the authors claim in various parts of the book that recurrent education will equalise both educational opportunity and results, prevent social disintegration, and cure inflation. As an example of these hopes, Alberto Melo seems to agree that inflation could be cured by asking wage-earners to "restrain their money demands and be given, in turn, a certain number of educational vouchers to be exchanged against a year of schooling, according to a fixed periodicity." Such optimism may dangerously divert attention from major problems of educational policy.

Apart from a thoughtful article by Gerry Fowler on recurrent education in Britain and an interesting article by Melo on the work of OECD between 1961 and 1971, when its previous confidence in the economics of education was shaken, this book is disappointing. Although the authors concede that differences between 'recurrent education,' 'lifelong learning,' 'education permanente,' and 'continuing education' are more than semantic they do not examine in any detail theoretical models worked out by a number of individual authors, often at the request of international agencies. Their analysis of the changes occurring in society to which recurrent education is expected to respond is frankly journalistic. Their practical proposals are of a most general kind and their assessment of outcomes is wholly optimistic. Their plea for recurrent education may convince governments but I fear it does not convince me.

BRIAN HOLMES.

KLINE P. (Ed.) (1973). *New Approaches in Psychological Measurement.* London: Wiley, pp. ix+269, £5·50.

There are so many books of readings and symposia on specialised psychological topics nowadays that one wonders who buys or reads them. This collection of chapters, all but one by British authors, does focus on a theme which is likely to be useful to students and their lecturers, since new developments in testing occur so frequently that it is difficult to keep up with them. However, it does not quite come off because of inevitable unevenness in the way different authors approach their sub-topics. Five out of eight chapters admirably fulfil their purpose, but two are much more in the nature of research articles which, though interesting, take up far too much space and might have better appeared as journal articles. J. Holley's validation of the Rorschach by using Q technique factorisation is important, but unnecessarily detailed. And A. Gale, after making a good case for psychophysiological approaches to personality, requires 46 pages to analyse why a dozen experiments on the EEG and extraversion give contradictory results. The eighth chapter (actually the first in the book), by P. Levy gives a brilliant survey of developments in test theory. But parts of it are too technical for any who have not taken advanced courses in psychometrics and, therefore, likely to turn off aspiring readers.

The five better balanced chapters are well worth the attention of educational psychologists. J. Butcher gives an able summary of 'models' of intelligence (including Cattell's), of the heredity-environment controversy, and of creativity research. It is a pity that he was allowed only 23 pages. J. Hundleby, who has worked for some years with Cattell, provides a useful introduction to the latter's objective personality test batteries, including their difficulties as well as their merits. B. Semeonoff, well-known as an advocate of projective techniques, gives a scholarly and temperate review of the whole field (excluding only the standard Rorschach and TAT). D. Bannister and M. Bott have less novel material to present; but it is good for mental testers to be reminded of George Kelly's attacks on their trade, and there is a useful outline of the applications of the repertory grid method. Finally, the editor, P. Kline, takes up his favourite theme—the quantitative testing of psychodynamic hypotheses. The evidence, mainly from factorial studies, in favour of Freud's psychosexual stages, Jungian typology, and other dynamic constructs, appears rather unconvincing, but at least shows that clinical and psychometric approaches can be combined.

P. E. VERNON.

LAWRENCE, D. (1973). *Improved Reading Through Counselling.* London : Ward Lock., pp. 80, c. £1·95, p. £1·10.

The thesis of this book is that the underlying reason for some children being retarded readers is their lack of confidence and poor self-image and, therefore, it is possible to help the reading problem by improving the self-image through individual counselling sessions with a sympathetic non-professional adult. The author points out that selection of suitable children is necessary to eliminate those in need of a different kind of help, but he often gives the impression that the child's emotional life is the most important factor in reading retardation. Also, he states that, in his experiments, the children's reading attainment improved without extra attention from the class teacher.

Do the experiments bear this out and can their conclusions be generalised to populations other than the one studied ? The numbers involved were small and all appeared to be from similar rural schools. Most of the counsellors were selected on the basis of the head teachers' knowledge of the area, thus presupposing a fairly stable or compact community. Further testing in an urban community is surely necessary.

It is not mentioned if checks had been kept on the instruction the counselled children received in the classroom. Cattell's Children's Personality Questionnaire could be used twice only on one of the counselled groups and while there was a significant change in their scores on factor ' O ' it would have been useful to see if any of the other groups had also changed. Yet most of the counselled groups showed a satisfying improvement in reading and a further pilot study using reading games in conjunction with counselling gave promising results. The author does, however, appear to have been carried away by his enthusiasm and his results, while providing a useful counterbalance to the tendency to overestimate the cognitive side of reading retardation, should not be taken as showing that emotional causes are paramount.

JENNIFER STEWART.

MURDOCK, G., and PHELPS, G. (1973). *Mass Media and the Secondary School* Bsaingstoke : Macmillan, pp. xix+196, £3·50.

This is the report of the first project of the Leicester Mass Communication Research Centre to be sponsored by an outside body—in this case the Schools Council. As the authors explain, " the brief of the project was to investigate the present state of mass-media teaching in English secondary schools and to explore the part played by the media in the lives of pupils." This they have attempted to do by considering, first of all, teachers' own media preferences and attitudes to ' pop culture ' (both of which are much out of tune, so it seems, with those of their pupils). Teachers' views on the influence on their pupils of television, pop music, newspapers, comics and magazines are carefully reported together with existing patterns of use of these materials in the classroom. 76 per cent of all teachers questioned used newspapers, for example, at least once per term. 34 per cent used pop record material. But there were great variations in use, which appeared to be closely linked with type of teacher training, university-trained teachers being much the least frequent users. As many as 67 per cent of teachers declared they never used radio and fewer than half ever used slides or schools TV. Indeed, many teachers saw an important part of their task to be the rejection of pop media and " the barricading of the classroom from the world of popular culture outside."

The second, and more interesting, part of the study looks at pop culture through the eyes of school children. Pop stars are classified, esteemed and identified-with in a complex, but consistent way, according to their life (and hair) styles, their respectability, and their unconventionality. They provide, or so the authors argue, a sense of identity to harassed adolescents ineptly handled in schools whose values they cannot accept. Pop culture provides " a means of articulating disengagement from school culture," an escape route chosen with especial enthusiasm, as the survey shows, by working-class children. Indeed, class differences in media usage proved considerable. The authors report great sensitivity on the part of school children to the all-important 'style' of media presentation and provide us with a useful 'children's typology' of styles (visual and pop-musical) established by semantic differential techniques. Much 'schools TV' misses the mark because it lacks the unique, but indispensable stylistic quality shared by such superficially disparate programmes as Top of the Pops, Monty Python, World in Action and the Avengers, all equally acclaimed by children as " trendy, fast and youthful." Preferences are far from random ; programmes and magazines are critically selected according to quite consistent criteria, which are, as the authors show, identifiably linked to school system, social class, sex and type of neighbourhood experience. Detailed case studies contrasting a particular secondary modern school with a particular grammar school underline the crucial importance of each of these factors.

The third section of the book is a statement of the authors' views on the implications of these findings for curriculum development in secondary schools. They advocate, with enthusiasm, the expansion of media-based activities as a means of enriching emotional and expressive growth and of closing the gap between school and environment. They go on to say, among many other controversial things, why they believe that children should be taught the practical techniques of media production and use, so as to be able, for example, to mount campaigns to influence social progress. In two useful appendices there is an account of, and an apologia for, the particular research methods employed.

This is an important and useful book, informative, eminently readable and with few wasted words. While not all educators will agree with the authors' conclusions, few will find these survey findings unrewarding of study.

JOHN LIGGETT.

MODGIL, S. (1974). *Piagetian Research : A Handbook of Recent Studies.* London : NFER, pp.ix+476, £6·50.

Dr. Modgil's volume will be of the greatest assistance to psychologists concerned with research in Piagetian psychology, since it attempts to cover almost all the work published (and many unpublished theses and papers) from about 1961 to 1972-3. Thus, it is a particularly useful supplement to Flavell's comprehensive survey of 1963. However, it is probably too advanced for undergraduate psychology students or teachers, as it assumes considerable familiarity with the complex terminology of Piaget and his translators. (For example, transduction, décalage, equilibration, decentration are used without any explanation). The bibliography includes some 1;600 references, though a quarter of these are not in fact derived from Piaget's work, and many others are prior to 1961. The contributions are grouped under 12 arbitrary, but convenient, headings ; and each chapter contains overall summaries of earlier and current work in the area, together with abstracts of major recent publications. There are some 180 of these abstracts of one, two or more pages each, which provide considerably more information than *Psychological Abstracts* and are, therefore, particularly useful to the researcher. Typically they describe : Aims or Hypotheses, Subjects, Methods, and Results. There is a certain amount of duplication between the introductory surveys and the abstracts, but perhaps this is unavoidable. Indeed, this kind of structure could very usefully be applied to many branches of psychology, though it must be very time-consuming for the author, and expensive to produce.

Turning then to successive chapters : I. The general introduction is rather off-putting, since it attempts to summarise the whole field, and includes large chunks of quotations from Piaget, his followers and his critics, in 5,000 words. Fortunately, the subsequent summaries are less condensed and more clearly expressed.

II. The Sensorimotor Stage. It is disappointing that so little has been done to replicate Piaget's substages, though the attainment of object-concepts has attracted attention. There seems also to be little or no interest in the preoperational and intuitive-egocentric stages, or in the functions of imagery, imitation and play. Or has the author failed to turn up relevant contributions ? The major burst of activity takes up at the transition to concrete operations. Here there are lengthy chapters on III, Conservation; IV, Effects of training on development ; V, Logical thinking (ranging, from class-inclusion among 5-year-olds to formal operations in adolescents) ; VI Space.

Considerable attention is given to methodology and experimental design, and to the difficulties of distinguishing children's attainment of concrete structures from their understanding of relational terms. Dr. Modgil is completely fair in drawing as much attention to negative findings and criticisms as to confirmatory studies. ' Space ' is somewhat disappointing ; almost certainly there must have been more work than is quoted ; thus Laurendeau and Pinard's large study (1970) is not outlined. Another area which has been missed is memory ; it seems unlikely that no one has followed up Piaget and Inhelder's novel findings here. Judgments of speed and motion also seem to be ignored ; likewise the whole topic of visual perception and decentration.

VII. Mental development in retardates is substantially represented, and VIII, Cross-cultural applications constitutes a major area of interest. However, as Dasen has shown, there are many studies besides those mentioned here. IX. Applications of Piaget to education and the school curriculum are of particular interest, although it is still unclear how far general intellectual strategies and abstract concepts can be ' taught.'

Chapter X on Moral development was written by Celia Scaplehorn. It is both more readable, and much longer than the rest, since it covers virtually all contributions, regardless of date. Thus, there are over 50 references on the work of Kohlberg and his followers alone.

Chapter XI is particularly useful since it takes up the role of affect and motivation which Piaget conspicuously neglected, and shows that substantial links are being found between cognitive and personality development.

Chapter XII deals with attempts to construct tests or scales from Piagetian tasks : Pinard and Laurendeau's, Vinh-Bang's, Tuddenham's, and the British Intelligence Scale. Perhaps the most usable is Goldschmid and Bentler's Concept Assessment Kit—Conservation. The difficulty is, of course, that most tasks given according to Piaget's ' clinical method ' are far too lengthy for psychometric purposes ; and it may still be true that shorter, more standardised, reasoning and other items cover effectively the same ground.

It is interesting to note that about two-thirds of the works cited are of American origin, despite the earlier reluctance in the USA to accept Piaget. British contributions come next, then miscellaneous (British Commonwealth, Scandinavian, etc.), and French references, apart from Inhelder and Piaget, are very few. Perhaps what is being done in France and Switzerland was less accessible to the author.

Unfortunately, the book lacks a subject index, though one can usually find one's way around from the chapter and section headings, and author index. The typeface and general appearance of the pages are positively ugly, particularly when 20 references by date appear on a single page. However, Dr. Modgil should be commended on accurate proof-reading of such a mass of detail. Only a few misspelt words or names, and one obviously wrong sentence (p. 340, lines 6-8) were noted.

P. E. VERNON.

MOSAK, H. H. (Ed.) (1973). *Alfred Adler: His Influence on Psychology Today.* New Jersey : Noyes Press and London : Methuen, pp. 306, £5·75.

The occasion of this book was commemorative, since it was published shortly after the centenary of Adler's birth by the American Society of Adlerian Psychology. Among its contributors are several past presidents of the society and other founder figures such as Alexandra Adler and Rudolf Dreikurs.

Nevertheless, its purpose is forward-looking and practical which accords with Adler's own principles, as the writers of the introductory memorial tribute are at pains to emphasise. The position he chose, so unlike Freud's in this among other major respects, encouraged diversity in his practising disciples ; with consequences which are obvious in the present book. The effect of individual psychology on the social and psychiatric thinking of American psychologists is certainly explicit, if only in the number of Adlerian institutes and societies which appear chiefly in the list of thirty-odd *curricula vitae* at the end. But a second result appears in the variety of independence of approach of the separate contributors which makes a content summary virtually impossible. By contrast, the seamless mantle of Freudian orthodoxy is a mild cause for wonder in the third generation.

The contributions are inevitably unequal in scope. Some, like Dreikurs' admirable exposition of *the private logic* and Lewis Way's interpretation of the literature of prejudice, are insightful overviews which do something to justity the claims of the title. Others describe a single technique for the use, or at least encouragement, of hard-working practitioners, who will probably find that the longest section of the book, which collects these studies under the heading of *Therapy* is in this modest way the most successful. Conversely, it is questionable if British educational psychologists will get as much from the next series, entitled Individual Psychology and Education. By the same token it is hard to quarrel with conclusions already familiar and D. Dinkmeyer contributes a good-tempered and persuasive parallel between the aims of school counselling and the Adlerian propositions for understanding individual life styles. A very similar approach appears earlier in the book in James Hemmy's well-argued case for an Adlerian analysis of the neurosis of hooliganism.

In the two remaining series, Individual Psychology and Social Issues and Individual Psychology and the Humanities, the studies are wider ranging. Sometimes for example, in the case of the black power phenomenon, the Adlerian explanations are only too predictable, whereas in the context of the Baha's religious cult they are at least surprising. But in one study which finds support for Adlerian doctrine in the life philosophy of Shakespeare's sonnets, there is a touch of the high seriousness which conscientious practitioners are in need of from time to time to refresh their enthusiasm.

A student picking up this book to read it through for its coverage value will be disappointed. It does not attempt a systematic account of the obvious derivations from Adler in modern personality theory. Rogers, White and Kelly, for instance, get barely passing mention. But perhaps this means that it is time for another and quite different book on Adler, and not that the present one has failed in its object. Clearly, it has not.

MARGARET MUNRO.

ROYCE, J. R. (Ed.) (1974). *Multivariate Analyses and Psychological Theory* : London : Academic Press, pp. xvi+567, £8·20.

This book provides a detailed record of the Third Banff Conference on Theoretical Psychology. As the participants included Cattell, Friske, Gray, Guilford, Messick, Pawlik and Vernon, to name but a few of the many leading researchers present, it is not surprising that the book is a valuable source of information on the current state of the subject. Despite the title, the main theme of the conference appears to be the possibility of going beyond the immediate output of factor analysis to construct useful theories of behaviour.

The papers fall into two main sections, those that are technical in the sense that they are " methodological, pretheoretic or metatheoretic " and those that are attempts to construct multivariate theories. Each paper is followed by a discussion, comments, an edited discussion and a rejoinder from the author. Despite the organisation there is present the inevitable disjointedness of a collection of papers. This is especially true of the first part of the book which makes it difficult to assess the work as a whole. Indeed, a multivariate model might be needed to adequately describe it.

The first of the technical papers indicate that the researchers are only too aware of the limitations of the techniques with which they aspire to study behaviour. Indeed, having read this comprehensive critique of the subject, one begins to wonder about the possible value of subsequent papers. However, the latter papers in this section demonstrate that complete explanations of behaviour must be multivariate in nature and probably more comprehensive than any attempted so far. The empirical difficulties in obtaining global theories are to some extent reduced by attempts to compare and integrate from different factor analytic studies.

As a connection between the two parts of the book several papers discuss and extend Guilford's structure of intellect model of intelligence. There appears general consensus among the participants that this is the most comprehensive and viable model of intelligence to date. This is followed by an attempt, in a long paper by Royce, to invent an overall theory of individuality or at least a framework within which one might be constructed. This incorporates cognitive variables, affective variables and their interactions together with the effects of age, environment and the relationship to underlying physiological processes. Such an attempt must inevitably be controversial; however, there is little doubt that this is a useful contribution to multivariate psychology. Subsequent papers consist of the exposition of multivariate models of increasing specificity dealing with emotion, motivation, depression and delinquency.

The extent to which the proposed theories contribute to our understanding of behaviour is not clear at present. Ultimately, their success can be measured by the extent to which non-factor analytically orientated psychologists find their theories helpful. At present the majority of experimental psychologists probably will continue to make little use of factor analytically derived theories in their research.

R. R. MACDONALD.

STRUPP, H. H. (1973). *Clinical Research and Theoretical Issues.* New York : Aronson, pp. 816, n.p.

This book is a collection of the papers on psychotherapy by Strupp, reporting his researches and ideas over the past 15 years. Collections of papers need some special justification. The most usual one is the repute of the author. Most psychologists in psychometrics, say, would enjoy collections of papers by Cattell, Burt or Eysenck. They would be highly valuable sources of reference and overall, if carefully selected, they could easily propound some definite thesis. In the field of psychotherapy Strupp probably does not reach quite such heights but, nevertheless, in his 31 papers spreading over more than 800 pages, there is a solid contribution to the area.

First we must look at coverage. The therapists' contribution to therapy is the subject matter of about half this book, the rest being taken up with a number of subjects such as the methodological problems of studying psychotherapy as an interaction process, a discussion of modern trends in psychoanalytic thinking and the problems of research at all in clinical psychology, i.e., its place and value *vis-a-vis* therapy. We have discussed the contents of this book because readers of the *Journal* may be wondering what relevance a collection of specialised papers on psychotherapy has to education. Strupp, in his introduction, puts the case well : " I have come to see the nature of the therapist's influence and the patient's susceptibility to that influence as one of the core problems in psychology. . . It is a problem of learning more about the principles that make it possible for one person to have a pervasive interest in another. In this light research in psychotherapy is central to problems in child rearing, education . . . " This is a view with which your reviewer most strongly agrees. Ultimately, the problems of education and psychotherapy, probably indeed the aims and methods, are one. Thus, the value of this book for the educational psychologist, rather than the specialist in psychotherapy, must depend on how well Strupp has dealt with the quintessence of psychotherapy.

Here we have to turn to by far the largest sections in the book—the empirical studies of the therapists' contribution. Here, too, we see the weakness in collections of papers. Many of the investigations which were, in their time, original are now old hat. The efforts to quantify variables and to formulate objectives are examples. Workers in the field of psychotherapy and teaching methods accept the necessity for such techniques partly as a result of such workers as Strupp. Nevertheless, on reading reading these papers there is a certain air, as there should be, of *déjà vu.* Furthermore, since there are differences in the local problems of psychotherapy and education, the particular techniques in the empirical researches cannot be automatically transferred. One other important point deserves mention. Only a psychologist of heroic super-ego could read these papers through as a book. They have to be regarded as individual and separate contributions, a book to read at intervals, for a specific purpose.

In conclusion, this book will be most useful for specialists in research into psychotherapy, although thoughtful educationists will be able to extract useful things from it. Whether Strupp was justified in collecting these papers together seems more doubtful to this reviewer who will, nevertheless, from time to time, be pleased to be able to consult one of these papers rather than look it up in a doubtless unobtainable journal.

P. KLINE.

WALKER, C. (1974). *Reading Development and Extension.* London : Ward Lock Educational, pp. 136, £1·40.

The author's justification for ' yet another book ' on the teaching of reading is that the emphasis in much of the literature on the subject is on beginning reading and remedial reading, and that there has been a relative neglect of the importance of extending basic reading skills in the junior and secondary school. He does devote a small section of his book to remedial reading but his main theme is the extension of reading for the majority of children. He points out that whilst the infant teacher has clear aims in developing the basic skills of reading, the junior teacher has no such guide for her stage and the incidental nature of the development of reading skills beyond the infant stage is criticised. The book, therefore, deals with aims, methods and organisation in respect of intermediate and higher reading skills.

Walker emphasises that reading is a synthesis of many skills and that the active critical reader does not become so by the practice of a number of separate skills in isolation. An important and worthwhile section of the book deals with teacher-directed oral group activities and sensible and practical advice is offered to teachers in developing a critical approach to reading in their pupils. Included is a section on the use of textbooks which will be of considerable help to students in the pre-service period. In dealing with efficiency in reading, the author looks at the advantages and possible drawbacks of reading laboratories. He also includes a chapter on reading for enjoyment and stresses the need for the teacher to know children's literature before she can guide children to enjoyment from reading. " Teachers are not well-known for keeping abreast of children's literature and consequently are ill-equipped to advise or suggest if the only acquaintance they have with it is their recollections of their own schoolday reading."

The book ends with a chapter on classroom organisation for reading extension. The author makes a plea for one hour every day to be set aside for a reading lesson. This hour should be regarded as inviolate. Time and quality are what reading has lacked in the majority of our junior schools. Walker contrasts the uncontested place given to mathematics in the timetable with the position of reading. "It is unfortunate that no one has spoken up . . . for the cause of reading, for surely a great deal of what is done in schools today in the name of reading can only be described as confusion and profitless meandering." However, the Bullock report may do something to redress the balance. In the same chapter Walker has advice for LEAs and for colleges of education. Researchers do not escape criticism either. "Reading suffers from being over-researched." It is surprising, therefore, that no reference is made in the book to research published within the last six years. The author advocates no research into the theoretical aspects of reading for the next five years, but instead recommends the concentration of our efforts on the practice of teaching reading, especially at extension levels.

This book contains much of value for teachers and it will, indeed, be surprising if it does not appear on the reading list for many students in training.

A. MILNE.

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SUBJECT PREFERENCE AND CHOICE IN CO-EDUCATIONAL AND SINGLE-SEX SECONDARY SCHOOLS

By M. B. ORMEROD

(Department of Education, Brunel University)

SUMMARY. The subject preferences and subject choices of 1,204 pupils in 19 secondary schools were investigated. Sex-linked polarisation of subject preferences were more marked in co-educational than in single-sex schools. An investigation of the effect of attitudes towards teachers showed a relationship between liking for teacher and subject preference, but not subject choice. The results are discussed in relation to the current reorganisation of secondary schools along co-educational, as well as comprehensive, lines.

INTRODUCTION

IN all types of maintained secondary schools in England and Wales pupils are confronted with subject choices at an earlier age than in most other countries (Phillips, 1969). These choices are most frequently offered at the end of the third year of secondary education and are major determinants of the direction taken by the more able pupils in their studies even at the tertiary level (Dainton, 1968). This study examines how sex-stereotyping and liking or disliking of teachers may affect subject preferences and subject choice in single-sex and co-educational secondary schools.

Recent reports on subject choice in secondary schools (Lewis, 1972) have concentrated on sixth-form specialisation in spite of an emphasis in the Dainton Report (1968) and by Phillips (1969) that earlier choices are of crucial importance. Selkirk (1973) has appealed for research into the earlier stages of the process of subject choice where, at around age 14, choices have three main constraints :

(1) Optional subjects are timetabled against each other in a bewildering variety of ways (see, for example, Pheasant, 1961).
(2) University entrance requirements often demand particular GCE O-level subjects (e.g., French for scientists or Latin for historians).
(3) Potential university aspirants are generally expected to take eight or more subjects, leading some pupils to choose subjects for which they have no distinct preference.

While there have been many studies since the 1930s (e.g., Silance and Remmers, 1934 ; Pritchard, 1935) which have examined rankings of school subjects or generalised attitudes, few have measured preference for individual subjects. Even ' attitude to science,' which has received considerable attention (see Gardner, 1975), involves some degree of generalisation. In the present study, however, preference is measured towards individual subjects using a grid method developed contemporaneously with that reported by Duckworth and Entwistle (1974).

Attitude towards teachers (teacher liking, for short) has attracted much less attention, possibly because of the reluctance of schools to allow it to be measured. The NFER science attitude questionnaire (Nuttall, 1971) does, however, have a scale referring to science teachers and this shows a correlation of 0·40 with science interest. On the other hand work in America, summarised by Kahn and Weiss (1973), has measured not just global effects but also the relationships of a variety of detailed characteristics of teachers to the attitudes of their pupils. A study of the interaction of pupil and teacher characteristics in physics has been made by Gardner (1974) in Australia, while in England, Taylor *et al.* (1973) have reported differential effects on boys' science interests of teachers with different views of their role. These studies imply that the influence of teachers on pupils' attitudes is considerable. This finding is in contrast to early work with secondary school pupils (Pritchard, 1935 ; Lambert, 1945 ; Meyer and Penfold, 1961) who reported that liking for teachers had a negligible influence on pupils' subject preferences.

The main theme of this report is, however, the contrasting effects of single sex and co-education on subject preference and choice. The greater preference for science and mathematics among girls educated in single-sex schools in comparison with their co-educated sisters has been noted in a variety of studies, all cited by Dale (1974). Dale himself reports significant differences in seven subjects when the co-educated children are compared with their counterparts in single-sex schools. Until recently the relative effects of single-sex and co-education on preferences have been confused by the fact that the parents of the co-educated children have tended to be, on average, of lower social class. Thus, an imbalance of middle-class girls and working-class boys in university science faculties could be attributed either to social class differences or to the type of school attended. Dale has now shown that, even when the class factor is held constant, there are biases in subject choices which favour arithmetic and physics among 'single sex' girls ; French, needlework and cookery among co-educated girls ; French among 'single sex' boys and physics and games among co-educated boys. There are no differences in English literature. The present study throws further light on the interpretation of these findings.

METHOD

Sample.

1,204 pupils (518 boys, 686 girls) were drawn from 10 single-sex grammar schools, five co-educational grammar schools and four comprehensive schools in four major regions : the North, the industrial Midlands, the arc of mainly agricultural counties from the South coast to East Anglia, and lastly from the South-East, including Greater London. This regional sampling takes account of the differences in the level of tertiary educational aspiration shown in the DES *Statistics of Education* (1972). 540 children (225 boys, 315 girls) were in co-educational schools, while 664 (293 boys, 371 girls) were in single-sex schools. The sample was drawn only from classes in which 75 per cent of the pupils were expected to enter for five or more GCE O-level subjects.

Development and Reliability of the Brunel Subject Preference Grid.

The Brunel Subject Preference Grid (Figure 1) uses a paired comparison method to obtain a ranking of popularity of a school subject. After shading out rows and columns corresponding to subjects not taken, the pupil works through the grid inserting in each cell the symbol for the preferred subject of the pair to which the cell corresponds. Summation of all the symbols of the subject in its row and column gives a rank score for its popularity which can be adjusted to a common total of 14—the median number of subjects taken in the whole sample. The effectiveness of the choices made may be shown by the absence of circularity in the responses. Kendall (1970) investigated the problem of circularity in such grids and devised the coefficient of consistence (zeta, ζ), as its index. Zeta attains

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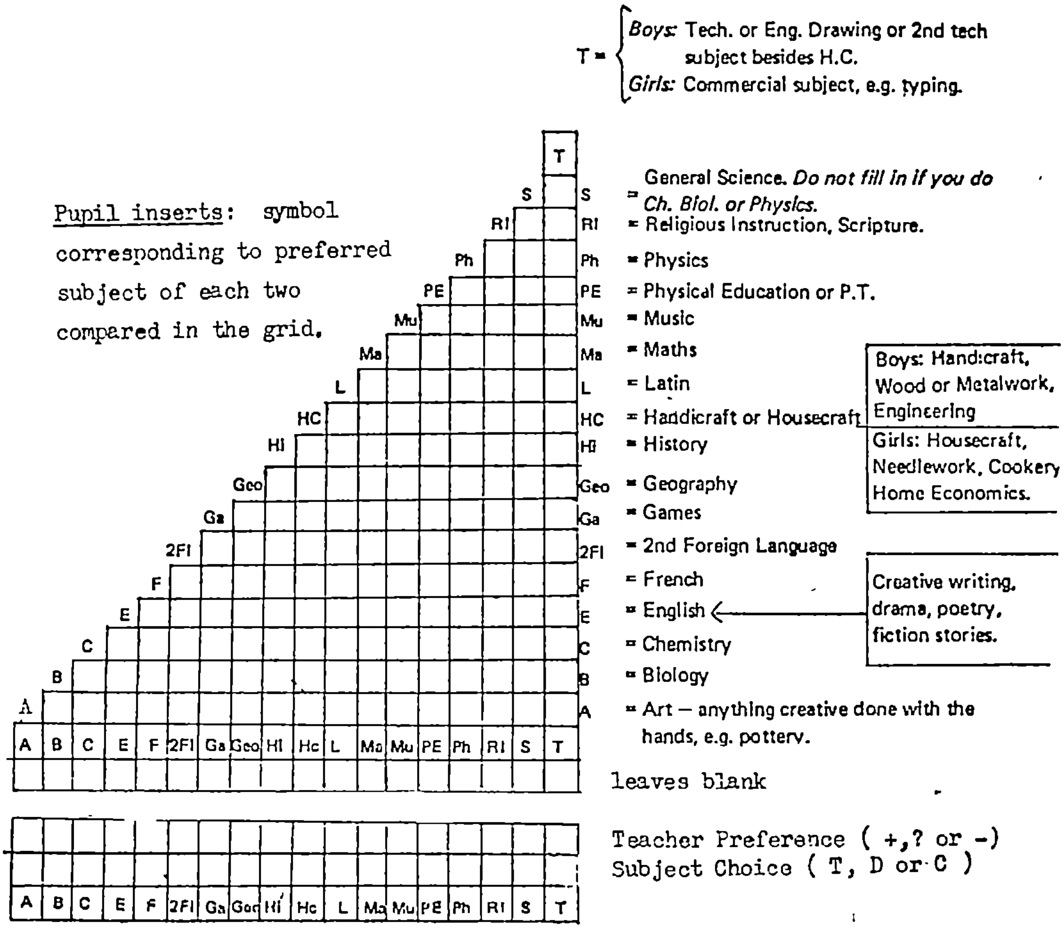
unity in the complete absence of circularity. This statistic was computed for each pupil. Median values for boys and girls in the sample were both ·96. The first decile was ·87 indicating that only a comparatively small number of pupils had difficulty in distinguishing between their preferences for certain pairs of subjects. This finding coincides with the results of a previous study (Ormerod, 1971) where pupils of a similar age simply made lists of subjects in order of preference. The reliabilities of all the measures in the grid were obtained by test-retest methods. For subject preference the mean of the Spearman's rho coefficient for two rankings produced by 90 pupils was 0·93 when the grid was readministered on the same day in a diagonally reversed form. An identical value of rho was found with another 90 pupils retested in a similar way but after 18 days holiday.

FIGURE 1

BRUNEL SUBJECT PREFERENCE GRID



T = Boys: Tech. or Eng. Drawing or 2nd tech subject besides H.C. Girls: Commercial subject, e.g. typing.

Pupil inserts: symbol corresponding to preferred subject of each two compared in the grid.

S = General Science. *Do not fill in if you do Ch. Biol. or Physics.*
RI = Religious Instruction, Scripture.
Ph = Physics
PE = Physical Education or P.T.
Mu = Music
Ma = Maths
L = Latin
HC = Handicraft or Housecraft
Hi = History
Geo = Geography
Ga = Games
2Fl = 2nd Foreign Language
F = French
E = English
C = Chemistry
B = Biology
A = Art — anything creative done with the hands, e.g. pottery.

Boys: Handicraft, Wood or Metalwork, Engineering
Girls: Housecraft, Needlework, Cookery Home Economics.

Creative writing, drama, poetry, fiction stories.

leaves blank

Teacher Preference (+,? or -)
Subject Choice (T, D or C)

Pupils were also directed to record their liking for the teacher currently teaching each subject by putting +(=like); —(=dislike) or ? (=neither like nor dislike particularly) in the appropriate cell in the Brunel Preference Grid. Preliminary discussions with pupils had indicated that these were the only consistent responses that could readily be elicited about their attitude to their teachers but even then they were often unable to supply reasons for them. These responses correspond to the three archetypal primary stances (acceptance, rejection or irresolution) adopted even by adults when pressed about a matter on which they may have strong feelings (Hovland, 1957). The symbols —, ? and + were then converted to the ordinal scores, 1, 2 and 3, respectively, for the purposes of analysis.

Pupils indicated in the bottom row of cells in the grid whether they were taking or dropping a subject by choice by the symbols T or D. They had to put the symbol C if a subject was compulsory. Subject choice was treated as a dichotomous score (D=1, T=2), with compulsory subjects omitted from the analysis. The reliability of these two operations was checked by test-retest methods on the same day, yielding values of Goodman and Kruskal's gamma of 0·95 and $\tau = 0{\cdot}84$, both for boys (N = 67) and girls (N = 92) in teacher liking and 0·99 (τ = 0·98) for boys and 0·96 (= τ 0·92) for girls in subject choice.

Statistical Treatment.

Since all the measures, even subject choice, are at least crudely ordinal their relationships were measured in terms of Goodman and Kruskal's gamma—' G ' (1954, 1963) which has a standard error and can be partialled (Davis, 1967). Kendall and Stuart (1967) recognise the superiority of gamma to τ and also note that the latter can only attain unity when the number of intervals in one measure is a multiple of those in the other.

RESULTS

The Relative Popularity of Subjects and their Teachers.

The problem of obtaining the most reliable orders for these two sets of measures is that not all pupils take all subjects. Thus, raw medians are not the best indices of relative popularity. More satisfactory rankings can be obtained by successive examination of the subject preference scores of all those, and only those, who have been studying each pair of subjects. This means that $\frac{1}{2}$n (n–1) comparisons have to be made, where ' n ' is the maximum number of subjects studied. For each pair of subjects the Wilcoxon Matched-Pairs Signed Ranks Test (Siegel, 1956) was used to decide the more popular subject which was then entered as the corresponding symbol in the Brunel Subject Preference Grid. The same procedure was adopted with the pupils' collective votes on the popularity of the teachers of each subject. Scoring the grids as before yielded highly consistent ' popularity ' scores as estimated by Kendall's zeta. These scores can be regarded as almost the reverse of subject preference in Table 1. Only when consistency is perfect (zeta=1·00) is a perfect sequence of popularity obtained. Otherwise some scores are equal and others missing (i.e., there are ' ties ').

The subject rankings show only moderately significant correlations (P<·10) with those reported by Duckworth and Entwistle (1974) in their fifth year GCE pupils' rankings of nine school subjects for interest and for social benefit, but the age difference between the two samples may account for some of the disparities in rankings.

TABLE 1

POPULARITY SCORES OF GCE PUPILS FOR SCHOOL SUBJECTS AND TEACHER LIKING, THEIR CONSISTENCIES AND THE RANK ORDER CORRELATIONS BETWEEN THEM.

Boys			Girls		
	School Subject	Teacher Liking		School Subject	Teacher Liking
Games	16	15	Games	15	14
Physical Education	15	8	Physical Education	14	15
Geography	14	11	History	13	13
Handicraft	12	12	English	12	10
Mathematics	11	14	Housecraft	11	3
Physics	11	5	Geography	10	11
Technical	11	13	Art	9	11
History	10	9	Biology	8	9
Biology	8	6	Mathematics	7	7
English	7	3	French	6	5
Chemistry	6	10	Second modern language	5	2
Art	5	15	Physics	4	9
Second modern language	4	4	Chemistry	3	6
French	3	3	Latin	2	2
Music	2	1	Religious Education	1	3
Latin	1	7	Music	0	0
Religious Education	0	0	(No technical subject)		
Consistency (Zeta)	·98	·94		1·00	·96
rho (P<)	·63	(·01)		·80	(·001)

The high correlations between subject preference and teacher popularity are noteworthy. A similar, but less close, relationship is revealed when the proportion of pupils choosing a subject is used as its index of popularity. The extraneous influences on subject choice mentioned earlier presumably account for this lower correlation. When obviously sex-linked subjects, such as handicraft, housecraft and the boys' technical subjects, are dropped from the list of subjects shown in Table 1, there are highly significant correlations between the relative popularities of the subjects between boys and girls (rho= ·77, P< ·001). This relationship also holds for teachers of those subjects (rho= ·63, P< ·01). Differences between the sexes in subject popularity arise in mathematics, physical sciences and languages and art (see Table 2).

The Gender of School Subjects.

A gender can be assigned to each subject on the basis that it is either more popular with one sex or it is chosen predominantly by one sex. The Mann-Whitney U test was applied to the subject preference scores to determine the gender. In all cases, except music, the result was the same as that obtained by seeing whether a subject is higher on the girls' list of popularity or on that of the boys. Thus, we have :

'MALE' SUBJECTS : chemistry (C), geography (Geo), mathematics (Ma), physics (Ph), boys' games, boys' physical education, handicraft and boys' technical subjects.

'FEMALE' SUBJECTS : art (A), biology (B), English (defined as anything creative or literary) (E), French (F), second modern language (2F1), history (Hi), Latin (L), music (Mu), religious education (RE), girls' games, girls' physical education and housecraft (HC). Since girls' technical subject (T) included additional aspects of housecraft and commercial subjects, this category was considered too heterogeneous and was omitted from all the analyses.

The subject genders agree with those derived by taking the majority sex for each subject from the tables of countrywide GCE O-level entries in the latest DES statistics (1972) (see Table 2). Because of university entrance requirements, examination entries (i.e., 'choices') make French, English and possibly Latin, more 'male' than would preference alone. Biology is probably more 'female' for the same reason.

TABLE 2

THE GENDER SPECTRUM OF SCHOOL SUBJECTS.

Gender	Male←				neutral point									→Female
Subject	C	Ph	Ma	Geo	↓	Mu	B	Hi	2F1	L	A	F	E	RE
Critical Ratio	9·3	8·2	4·5	0·6		0·4	0·5	1·0	1·1	1·5	2·5	6·8	7·1	7·3
Percentage of Boys	70	79	61	55		36	37	48	41	49·7	43	46	43	37

NOTES : (1) Percentage of boys is derived from 1972 GCE entries.
(2) Critical ratio in Mann-Whitney U test for difference between sexes in subject preference.

By using the critical ratio obtained in the Mann-Whitney U test as an index of the magnitude of the difference in preference between the two sexes, it is possible to arrange all the subjects taken in common in a 'gender spectrum' ranging from extreme maleness to high femininity (Table 2). The analyses of research into the contrasts between the sexes in mental skills made by Maccoby (1970) and by Hutt (1972) reveal the heightened development of spatial abilities in boys and of verbal skills in girls. Apart from art and religious education, it will be seen that it is precisely the subjects which require these skills which have turned up at the appropriate ends of the spectrum.

The Polarisation of Subject Preference and Choice in Co-educational Schools.

The earlier review of the literature indicated that sex-stereotyping would be expected to be stronger in co-educational schools. As a result it may be hypothesised that there will be a stronger preference for 'female' subjects by girls and 'male' subjects by boys in the co-educational schools, together with a greater aversion for subjects of opposite gender by each sex. In other words, in co-educational schools preferences and choices for all subjects should polarise, and, of course, polarise in the predicted direction. The tests of the hypothesis are given in the lower half of Table 3 firstly by examining the proportions of pupils of each sex choosing or preferring a subject in the different types of school and secondly by examining the size of the sex differences in each subject. Except for subject preference polarisation, all the differences in Table 3 have been divided into those significant above and below the ·05 level. In the absence of a widely accepted test of the significance of the differences in differences, polarisation of subject preference in co-educational schools has been determined by comparing the critical ratios yielded by the Mann-Whitney U test for sex differences in the two types of schooling involved.

TABLE 3

EVIDENCE FOR THE POLARISATION HYPOTHESIS IN TERMS OF DIFFERENCES IN SUBJECT PREFERENCE AND CHOICE BETWEEN PUPILS IN CO-EDUCATIONAL AND SINGLE-SEX SCHOOLS.

		For hypothesis		Against hypothesis		Sign Test (5)	
		P<·05	P>·05	P<·05	P>·05	All	P<·05
Subject Preference (2)	Boys	B, F, Hi, Mu, PE, Ph, RE, T	A, C, E, 2F1, Geo, HC, L.		Ga, Ma	15 : 2 P<·001	8 : 0 P<·01
	Girls	A, 2F1, Ga, HC, Ma, Ph	B, C, E, F, Geo, Mu, PE	Hi	L, RE	13 : 3 P<·01	6 : 1 P<·10
Subject Choice (3)	Boys	A, B, 2F1, Hi, L, Mu, Ph, RE	C, F	HC	Geo, T	10 : 3 P<·05	8 : 1 P<·05
	Girls	2F1, Geo, HC, Ph	A, C	B, Hi, Mu	F, L, RE	6 : 6 NS	4 : 3 NS
Polarisation of subject choice (4)		A, F, 2F1, Geo, Ph, RE	C, L	HC	B, Hi, Mu	8 : 4 NS	6 : 1 P<·10
Polarisation of subject Preference		A, B, C, E, F, 2F1, Geo, L, Ma, Mu, PE, Ph, RE		Ga, Hi		14 : 2 P<·01	

NOTES : (1) Key to Subjects : A—art, B—biology, C—chemistry, E—'creative' English, F—French, 2F1—second modern language, G—games, Geo—geography, Hi—History, HC—handicraft (boys) or housecraft (girls), L—Latin, Ma—mathematics, Mu—music, PE—physical education, Ph—physics, RE—religious education, T—technical subject (e.g., engineering, needlework or commercial subject (girls).

(2) Significance of differences tested by Mann-Whitney U Test (Siegel, 1956).

(3) By significance of difference between two proportions (Guilford, 1965).

(4) Based on large sample test for a single proportion (Hays, 1973).

(5) Sign test (Siegel, 1956 ; Hollander and Wolfe, 1973).

Having categorised school subjects as in Table 3, the sign test can be applied to each situation to estimate the likelihood of the number of differences which support or require the rejection of the hypothesis having arisen by chance. The sign test can be applied to all differences on the grounds that, if random, even the non-significant ones should be equally divided (Hollander and Wolfe, 1973) More rigorously, the sign test can be applied to the significant differences only (Siegel, 1956). In either case it will be seen that the predominance of subject differences supporting the hypothesis is highly significant for both sexes with respect to subject preference, significant in the case of boys' subject choice and insignificant but not contradictory, in the case of girls' subject choice. These findings should not, however, be accepted at face value, as the following analysis serves to indicate.

TABLE 4

INTER-RELATIONSHIPS BETWEEN SUBJECT PREFERENCE, SUBJECT CHOICE AND TEACHER LIKING

		Subject preference —teacher liking		Teacher liking —subject choice		Subject preference —subject choice	
	N	G	Range	G	Range	G	Range
Boys							
Single-sex ...	293	43	26 (Ga) 61 (2F1)	09	−48 (F) 48 (T)	70	54 (F) 92 (C)
Co-educated ..	225	56		11		73	51 (RE) 88 (Mu)
Girls							
Single-sex ...	371	47	31 (A) 51 (Hi)	10	−28 (B) 48 (F)	66	63 (L) 88 (RE)
Co-educated	315	44		11		64	(46 Hi) 80(2F1)

NOTES: (1) G (decimal points omitted)=global gamma (Goodman and Kruskal, 1954. 1963) derived by consolidating tables for relationship in each subject into one grand table.
(2) Global G and coefficients quoted in ' range ' for teacher-liking-subject choice and for subject preference-subject choice are partial coefficients with the third variable held constant.
(3) N=number in most common subjects.
(4) Symbols for subjects are as in Table 3.

Relationship between Subject Preference and Teacher Liking.

Using Kruskal's gamma statistic substantial correlations (usually 0·4 to 0·6) are found. The values tend to be highest in unpopular subjects which also tend to have unpopular teachers (see Table 1). If these correlation coefficients are ranked for magnitude and these ranks are themselves correlated with the popularity ranks of either the corresponding subjects or their teachers, negative values of Spearman's rho are obtained, three of which attain the 5 per cent level of significance. Overall the preferences of co-educated boys correlate significantly more highly with teacher liking than those of the other three groups ($P < \cdot 02$), but this is not due to significantly higher coefficients in any specific subject other than the second modern language.

The reasons for pupils' like and dislike of teachers have not been probed in this study, but the relationship which has been established between subject preference and teacher liking indicates that, in interpreting differences in ' subject preferences ' between pupils in co-educational and single sex schools, attitudes towards teachers may play an important mediating role.

Relationship of Subject Choice with Teacher Liking.

Keeping subject preference constant using partial correlation, only weak relationships are found between subject choice and teacher liking. One sound reason for this is that often pupils do not know whether they are going to have the same teacher in the following year. There are also external constraints on choice. In individual subjects there are a wide range of positive and negative values. The appreciable positive correlations arise in ' practical ' subjects—where there is often more chance of having the same teacher because there are fewer groups. The notable negative correlations arise because considerable numbers who did not like their last teacher are ' choosing ' a subject. They occur in precisely those subjects in which choice is most constrained, e.g., boys' French and girls' biology, but do not consistently illuminate the results in Table 4.

Relationship between Subject Preference and Subject Choice.

Keeping teacher liking constant, partial correlation coefficients provide an index of how well schools' systems of options accord with pupils' preferences. Although the global partial coefficients are high, the differences in specific subjects explain why the differences in girls' subject choices fail to support the polarisation hypothesis. Both co-educated and 'single sex' girls have their preferences met by less satisfactory choices than do the boys. It only needs the match between preference and choice to weaken appreciably with one set of girls, for the hypothesis which has held for preferences to be vitiated for choices. As might be expected, the main weakness is with co-educated girls. In their case, in five out of six subjects in which the differences in girls' subject choices are the wrong way round in Table 3, the correlations between subject preference and choice fall below the median for the group.

DISCUSSION

Dale (1974) postulates a polarisation hypothesis to explain his findings and tends to ascribe it to loss or gain of morale in one sex or the other when they find they are faring better or worse than the other sex being educated alongside them. This could well be a valid reason in the case of subjects at the extreme ends of the gender spectrum (Table 2) where differentiated spatial and verbal skills are likely to be involved. This cannot be the explanation of polarisation, however, in subjects where only one sex is involved—in, for example, physical activities, housecraft, handicraft and boys' technical studies. Now that a general picture of sex-linked differences has emerged in the present study, it seems possible that, at an age when they are becoming acutely aware of the other sex, in co-education boys and girls are expressing preferences and, when possible, choices in such a way as to reaffirm their perceived sex role.

Although this study affords no direct evidence, the results of other research raise the possibility that, in the physical sciences, teaching style and the neglect or emphasis of certain topics may be partly responsible for the greater popularity of these subjects in girls' schools than among co-educated girls. A considerable number of findings (reviewed by Ormerod and Duckworth, 1975) indicate that, in science at any rate, boys and girls have different learning styles and respond differently to various teaching strategies and types of teacher behaviour. Thus, the teaching of both sexes side by side can become a more difficult operation than the teaching of either sex alone. In the co-educational class the teacher may unwittingly adopt practices which encourage the boys, while reinforcing the girls' belief that physical science is a male preserve.

The pattern of preference in history is also of interest, since it is greater for both sexes when educated separately. The medians are :

Co-educated : Boys 7·35, girls 8·8. *Single sex* : Boys 8·9, girls 10·5.

In other words, girls' preferences (and choices) are contradicting the general hypothesis. History is only marginally a 'female' subject in terms of O-level entries, although it is more definitely 'female' in this sample. Dale (1974) reports a study by Jones in which wide variations between the sexes in the popularity of various themes in history are identified. Thus, a possible explanation of the anomalous results reported here might be that while it is relatively easy to satisfy either sex separately by the judicious selection of history topics, any amalgam chosen with co-educated classes in mind could prove less satisfactory to both.

In conclusion, the move towards comprehensive reorganisation carries with it a parallel, but unexamined, change to co-education. Generally it is assumed that co-education has few disadvantages, but Wood and Ferguson (1974) are very critical of Dale's findings on attainment. The present study, taken in conjunction with earlier work on subject choice in co-educational and single-sex schools, shows co-education at a distinct disadvantage in terms of attitudes to subjects which influence subsequent choices. It may still be that social advantages, such as those reported by Atherton (1973), outweight the narrower focus of interest created by sex-stereotyping in subject choice. Nevertheless, those who devise and sanction reorganisation schemes should surely wait for studies into ways of mitigating such disadvantages before proceeding.

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Since the preparation of this article the Department of Education and Science (1975) has published *Curricular Differences for Boys and Girls* (Education Survey No. 21), London : HMSO. Based on a much larger sample, the findings on subject choice at the same stage of secondary education, in the main, reflect those reported here. In the case of A-level choices, which are less distorted by influences noted here and in the DES survey, the polarisation in co-educational schools is even more pronounced.

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DEVELOPMENTAL AND SOCIAL INTERACTION IN CATEGORIES OF WORD-DEFINITION

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SUMMARY. Responses to the Terman-Merrill Vocabulary Test, Form L-M, of 100 children at each of five age-levels from 6 to 14 years in a judgment sample of 65 Northern Ireland schools were scored for 10 categories of definition. Factor analysis confirmed that two categories, Synonym and Explanation, might be combined as Abstract responses. Ordered stepwise regression confirmed the significance, as hypothesised, of age, occupation and joint age-by-occupation effects, in that order, for Abstract and Total responses. The joint effect was greater for Abstract responses, and showed that children of non-manual fathers differ progressively with age from children of manual fathers for those forms of definition, such as synonyms and explanations, that showed the strongest pattern of development with age.

INTRODUCTION

THE value of a qualitative analysis of the vocabulary definitions of children of different ages was recognised by Terman and Childs (1912), Terman (1916) and Pintner *et al.* (1944). Carter and Bowles (1948) and Wechsler (1949) stressed the diagnostic value of considering levels of definition given by children and adults.

Following the work of Marx (1928) and Green (1931), Feifel and Lorge (1950) reported a qualitative analysis of the Terman-Merrill Form L Vocabulary responses of 900 children aged 6 to 14. Though no type of response was exclusive to any age, the younger children tended to emphasise the particular or isolated features of words, whereas the older children more often used Synonym or Explanation types of response. Using Feifel and Lorge's categories with Form L–M Vocabulary responses over the age-range of 6 to 66 years, Storck and Looft (1973) confirmed that the developmental trend was one of progression from concrete and action-oriented definitions in early childhood to more abstract and conceptual formalisations in later childhood, with little change throughout the remaining years. As in Feifel and Lorge's study, there was no evidence of a sex difference in level of definition at any age.

Terman (1918) and Wechsler (1958) both acknowledged the criticism that vocabulary is necessarily influenced by educational and cultural opportunities, though Wechsler pointed out that a subject's cultural milieu is more likely to be revealed in quality of definition or knowledge of particular words than in total number of words known. Spache (1943) found that the Binet Vocabulary scores of children in private American schools tended to be in advance of these children's mental ages on the Stanford-Binet. Levinson (1958), in a comparison of native and foreign-born American children, found that Binet Vocabulary overestimated Binet mental ages for the native-born, and underestimated Binet mental ages for the foreign-born. Levinson took the view that vocabulary directly reflects the sub-culture of the home, as instanced in dull children with extensive vocabularies from superior homes, and bright children with limited vocabularies from impoverished homes.

Bernstein's (1962) distinction between 'elaborated' and 'restricted' modes of communication had its beginnings in the empirical observation that differences between English working-class and middle-class children are revealed most strikingly on a test of vocabulary (Bernstein, 1958, 1960). Bernstein's (1961) further suggestion that such differences will increase with age was confirmed by Jahoda (1964) in a small-scale study in which samples of lower working-class and middle-class children were matched on non-verbal intelligence at ages 10 and 14. Both age-groups were tested on the Heim and Watt's Self-Judging Vocabulary Scale. The findings supported the view that working-class boys who remain within a working-class environment tend to lose further ground in vocabulary performance between these ages.

Bernstein (1962) has argued that the language forms of working-class children are more concrete, or situationally specific, than those of middle-class children, whose language forms are conducive to a greater degree of semantic generalisation and precision. In a later formulation Bernstein (1971) concluded that middle-class children, through their forms of socialisation, are more oriented towards receiving and offering universalistic meanings in certain contexts.

Bernstein's argument is supported by a study, cited by Halsall (1973), in which working-class children tended to produce more concrete and fewer abstract definitions than middle-class children. Further corroboration comes from an American study (Carson and Rabin, 1960) in which 30 Northern white, 30 Northern negro and 30 Southern negro children were matched for age, sex, grade placement and level of verbal comprehension on a picture vocabulary test. The three groups differed on verbal communication as measured by levels of verbal definition on two conventionally presented vocabulary tests. Thus, the Northern white children favoured the highest definition levels, the Northern negro children gave poor quality definitions and the Southern negro children favoured the weakest response of all, 'Don't know.' Carson and Rabin concluded that verbal communication on the vocabulary tests, independently of comprehension, reflected wide differences in educational environment and opportunity for cultural advancement.

Relevant Hypotheses.

The evidence suggests that qualitative growth in vocabulary responses parallels quantitative growth. As children's definition vocabularies increase with age, more abstract forms of definition, such as synonyms and explanations, are found to be preferred. Again, but independently of age, both quantitative and qualitative differences in vocabulary responses have been observed for children from differing socio-economic backgrounds. Middle-class children, for example, have been found to offer a great number of definitions and a greater proportion of abstract-type responses than working-class children.

Are such socio-cultural differences cumulative with age? Surprisingly, this question has received little attention, though it would seem to be deducible as a tenable hypothesis from Bernstein's theory of social learning, and supported by Jahoda's evidence for quantitative vocabulary. It is to the testing of this hypothesis that the present study was directed.

Specifically, it was hypothesised that on a test of vocabulary definition children of non-manual and manual fathers would differ progressively with age in total number of vocabulary responses and in number of abstract-type responses. However, before proceeding to test these hypotheses it was considered necessary to establish that vocabulary responses over the age-span of 6 to 14 years might be reliably classified under a set of descriptive headings, and that these in turn might be reduced to a smaller set of categories which would distinguish abstract-type responses from more concrete forms of responding.

PROCEDURE

The data for the study were available from an earlier investigation designed to provide a tentative standardisation of the Terman-Merrill Vocabulary Test in Northern Ireland (Wilson, 1964). For this purpose two urban and two rural areas were chosen, on a judgment basis, as representative of the province. In three of the areas all schools were included. In one urban area, Belfast, the schools were sampled. In each school every pupil within one month either way of a chronological age of 6, 8, 10, 12 and 14 was tested on the 1960 Form L–M Vocabulary Test.

The test instructions were modified to the extent that number of consecutive failures was ignored, the object being to find out the total number of words each child knew. Vocabulary responses were recorded verbatim for 565 children in 65 schools. For analysis the samples were randomly reduced to 50 boys and 50 girls at ages 6, 8 and 12. As there were only 46 and 47 boys at ages 10 and 14, the numbers of girls were randomly adjusted to give a total of 100 children at each of these ages.

The age-samples were satisfactorily representative by urban-rural distribution, as were the 12 and 14-year-olds by type of secondary school. The samples showed an upward bias on father's occupation when compared with census data, though this may be explicable on the basis that fathers of children of school age are unlikely to be fully representative of the male population at large. For further analysis the children were classified on the basis of father's occupation as non-manual (i.e., professional, intermediate and skilled non-manual occupations) or manual (i.e., skilled manual, partly skilled and unskilled), as suggested by Robertson (1974).

RESULTS

Ten categories, taken from Feifel and Lorge (1950), were used to classify responses. These were Synonym, Explanation, Use, Use and Description in combination, Description, Demonstration, Repetition, Illustration, Inferior Explanation and Error.

Marker Reliability and Category Structure.

Three markers, including the author, provided the reliability data. Category exemplars from Feifel and Lorge and Storck and Looft were used by each marker as a basis for classifying responses on a subsample of 20 protocols stratified by age. All classifications were then discussed among markers.

For the reliability study proper a subsample of 100 protocols, stratified proportionally by age, was marked by each marker. Category by marker scores were intercorrelated. In order to examine inter-marker by inter-category structure, and in particular to test the hypothesis that Synonym and Explanation responses would differ qualitatively from the remaining categories, a principal components solution, terminated for eigen values of unity, was rotated by Varimax. The Varimax loading matrix is presented in Table 1.

TABLE 1

VARIMAX SOLUTION : CATEGORIES BY MARKERS.

Categories by markers		Factors								
		1	2	3	4	5	6	7	8	h^2
Synonym	1	92	−15	−15	−01	−12	−10	09	−03	92
	2	90	−17	−19	−01	−13	−11	13	−02	92
	3	90	−16	−18	02	−12	−13	13	−07	92
Explanation	1	77	−05	01	03	−10	−09	23	13	68
	2	91	−04	−08	−09	−13	00	05	07	87
	3	84	−05	−03	−05	−13	−01	10	19	77
Use	1	−05	91	05	−09	−04	05	−08	−21	90
	2	−16	89	13	−09	−04	02	−16	−18	90
	3	−16	88	11	−13	−08	07	−07	−18	88
Use and Description .	1	14	−25	−08	03	−04	10	−04	80	74
	2	12	−18	03	09	−12	00	−07	79	70
	3	09	−15	06	02	−04	12	07	85	78
Description	1	00	−09	−08	89	−07	−03	05	08	82
	2	23	−07	03	81	−17	−07	18	18	81
	3	−03	−10	−01	91	−12	00	−01	−03	85
Demonstration	1	−13	04	12	−04	−06	91	−10	00	88
	2	−15	16	15	−02	05	88	−06	01	85
	3	−08	−16	09	−04	08	68	04	30	61
Repetition	1	−08	05	91	00	−05	09	00	00	85
	2	−13	09	92	01	04	05	−06	02	88
	3	−17	09	85	−01	−03	24	−06	05	83
Illustration	1	−23	01	−01	−09	82	03	−17	−04	77
	2	−18	−03	−15	−10	85	03	−06	−07	80
	3	−19	−11	06	−12	89	00	−02	−04	86
Inferior Explanation .	1	27	−05	−02	04	−11	−11	80	−01	74
	2	37	−17	−03	08	−02	−04	77	00	76
	3	36	−11	−10	10	−13	−01	71	−01	68
Error	1	−94	00	02	−15	11	03	−22	−08	97
	2	−95	00	01	−15	13	03	−21	−10	100
	3	−94	02	04	−15	10	02	−23	−09	98
Percentage variance .		26·6	9·2	8·8	8·2	8·1	7·5	7·1	7·8	

(decimal points omitted)

The first factor is dominated by Synonym, Explanation and Error. This confirms the expected conjunction of Synonym and Explanation responses. Since Error score is in inverse proportion to total score on the test, the high negative loadings for Error responses indicate the essentially abstract or higher-level nature of the vocabulary test over the 6 to 14 age-span.

The category specificity of the remaining factors indicates that inter-marker agreement is consistently greater than inter-category overlap, though it is worth noting that Inferior Explanation, which defines factor 7, has also some 11 per cent of its variance in factor 1.

The *alpha*-coefficient of internal consistency (Cronbach, 1951) for Synonym and Explanation responses combined for the 500 subjects was 0·71. For the remaining categories, excluding Error, in combination the *alpha*-coefficient was —0·56, a value which confirmed that a homogeneous category of concrete-type responses could not be distinguished from abstract-type responses.

Hypothesis-testing.

For further analysis Synonym and Explanation responses were combined as Abstract responses. This category, with Use, Use and Description, Description, Demonstration, Repetition, Illustration, Inferior Explanation and Total responses, were the dependent variables in a series of ordered step-wise regression analyses. Regression analysis (RA) was preferred to analysis of variance (AV) for reasons advanced by Cohen (1968) and Walberg (1971), namely, that the RA model permits a more parsimonious testing for main, interaction and non-linear effects *provided* that the independent variables are ordered in regression on an *a priori* basis.

It had been hypothesised that over and above age and occupation as main effects, age and occupation would jointly contribute to assigned variation in both Abstract and Total responses. In effect, age and occupation were correlationally independent ($r=0{\cdot}00$) ; whereas occupation and age-by-occupation were very highly correlated ($r=0{\cdot}95$) and therefore susceptible to mutual borrowing or suppression artefacts. The independent variables were therefore ordered hierarchically in step-wise mode as follows :

(1) Age, hypothesised as a significant main effect.
(2) Occupation, hypothesised as a significant main effect.
(3) Age-by-occupation, hypothesised as a significant joint effect.
(4) Sex of subject, entered against the null hypothesis.
(5) Quadratic, cubic and quartic age components for age and age-by-occupation entered as an exploratory set in order to permit the detection of non-linear effects.

As a further constraint, an independent variable was entered into ordered regression only if its addition to assigned variation was significant at or beyond the 5 per cent level of chance. Table 2 shows the percentage addition to assigned variation at each step, with the significance level of the corresponding F ratio. The cubic component for age and the quadratic and cubic components for age-by-occupation, none of which contributed significantly to assigned variation, are excluded from the table together with the Demonstration category, for which no effect was significant.

TABLE 2

SIGNIFICANT PERCENTAGE VARIANCE INCREMENTS FOR ORDERED STEP-WISE REGRESSION.

Independent Variables	Dependent variables							Total
	Abstract	Use	Use and Description	Description	Repetition	Illustration	Inferior Explanation	
1. Age	51·46‡	6·09‡	5·00‡	3·95‡	0·94*	8·22‡	15·44‡	60·23‡
2. Occupation	2·97‡	1·06*	1·34†	0·00	0·00	1·23†	0·00	2·02‡
3. Age × occupation	2·16‡	1·88†	0·00	0·00	0·00	0·00	0·00	0·87‡
4. Sex	0·41*	0·00	0·00	0·00	0·00	0·00	0·76*	0·61†
5. Age^2	0·99‡	0·99*	0·00	2·52‡	3·79‡	1·42†	0·00	0·00
Age^4	0·00	0·00	0·00	0·00	0·84*	0·00	0·00	0·00
Age^4 × occupation	0·00	0·00	1·64†	0·00	0·00	0·00	0·00	0·00
Total assigned variation	57·99‡	10·02‡	7·98‡	6·47‡	5·57‡	10·87‡	16·20‡	63·73‡

* $P<0{\cdot}05$. † $P<0{\cdot}01$. ‡ $P<0{\cdot}001$.

TABLE 3

CATEGORY MEANS AND STANDARD DEVIATIONS BY AGE AND OCCUPATION.

			Abstract		Use		Use and Description		Description		Demonstration		Repetition		Illustration		Inferior Explanation		Total	
Age	Occupation	N	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
6	Non-manual	32	0·9	1·5	3·0	1·4	0·3	0·5	1·1	1·1	0·1	0·2	0·4	0·5	0·6	0·8	0·2	0·5	6·6	2·1
	Manual ...	68	0·6	0·8	2·4	1·6	0·2	0·6	0·9	1·2	0·0	0·2	0·3	0·6	0·6	0·9	0·4	0·6	5·7	1·7
	Total	100	0·7	1·0	2·6	1·5	0·3	0·6	1·0	1·2	0·1	0·2	0·4	0·6	0·6	0·9	0·4	0·6	6·0	1·8
8	Non-manual	41	2·7	2·2	2·6	1·2	0·9	0·9	1·6	1·2	0·1	0·3	0·8	0·9	0·2	0·4	0·3	0·5	9·1	2·1
	Manual ...	59	2·1	2·2	3·0	1·2	0·5	0·7	1·5	1·3	0·0	0·2	0·7	0·6	0·5	0·6	0·3	0·5	8·7	2·8
	Total	100	2·4	2·2	2·9	1·2	0·7	0·8	1·6	1·2	0·1	0·2	0·7	0·7	0·3	0·5	0·3	0·5	8·9	2·5
10	Non-manual	35	7·3	5·2	2·1	1·5	0·9	0·9	2·1	1·3	0·1	0·3	0·5	0·8	0·2	0·5	0·9	1·2	14·1	4·6
	Manual ...	65	5·7	4·1	2·5	1·1	0·7	1·0	2·0	1·4	0·1	0·3	0·6	0·8	0·2	0·5	0·8	1·0	12·7	4·2
	Total	100	6·2	4·6	2·4	1·3	0·8	0·9	2·0	1·3	0·1	0·3	0·6	0·8	0·2	0·5	0·9	1·1	13·2	4·4
12	Non-manual	43	13·0	7·0	1·8	1·3	0·7	0·9	1·8	1·2	0·0	0·2	0·3	0·5	0·0	0·2	1·1	1·2	18·8	6·4
	Manual ...	57	8·0	5·4	2·5	1·3	0·9	1·0	1·7	1·1	0·1	0·3	0·6	0·8	0·2	0·4	1·0	1·0	15·1	4·5
	Total	100	10·2	6·6	2·2	1·3	0·8	1·0	1·8	1·2	0·1	0·3	0·5	0·7	0·2	0·4	1·1	1·1	16·8	5·7
14	Non-manual	31	17·9	7·3	1·3	1·4	0·5	0·6	1·6	1·6	0·0	0·0	0·3	0·6	0·1	0·3	1·3	0·9	23·0	5·9
	Manual ...	69	12·5	5·4	1·9	1·3	1·1	1·2	1·9	1·4	0·0	0·2	0·2	0·5	0·1	0·4	1·4	1·2	19·2	4·6
	Total	100	14·2	6·5	1·7	1·4	0·9	1·1	1·8	1·5	0·0	0·1	0·3	0·5	0·1	0·4	1·4	1·1	20·4	5·3
All Ages	Non-Manual	182	8·3	8·1	2·2	1·5	0·7	0·8	1·7	1·3	0·0	0·2	0·5	0·7	0·2	0·5	0·8	1·1	14·3	7·5
	Manual ...	318	5·8	5·9	2·5	1·3	0·7	1·0	1·6	1·3	0·1	0·2	0·5	0·7	0·3	0·6	0·8	1·0	12·3	6·1
	Total	500	6·7	6·9	2·4	1·4	0·7	0·9	1·6	1·3	0·1	0·2	0·5	0·7	0·3	0·6	0·8	1·0	13·0	6·7

Figure 1

TOTAL RESPONSES

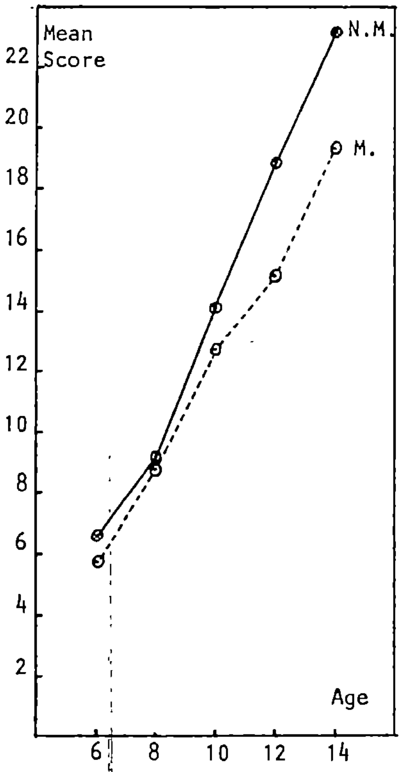


Figure 2

ABSTRACT RESPONSES

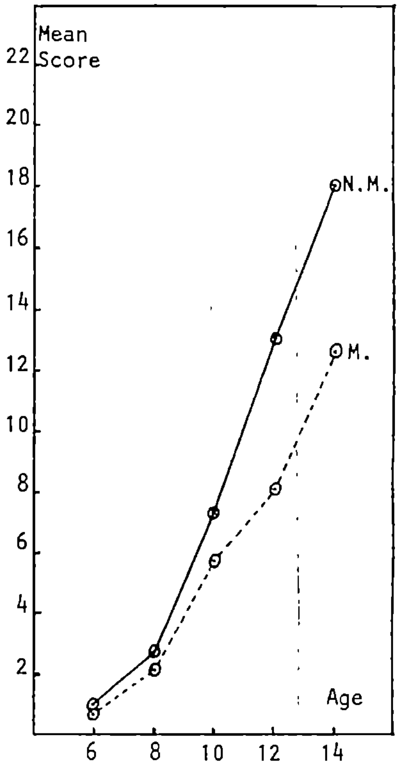


Figure 3

USE RESPONSES

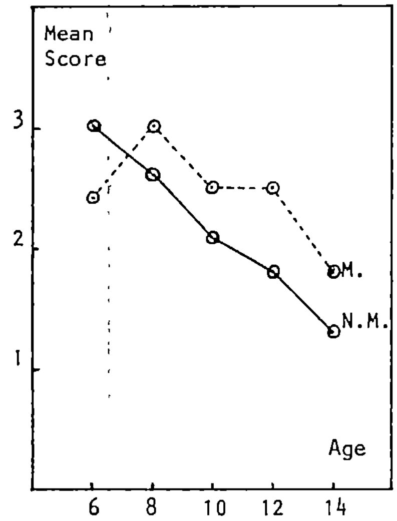
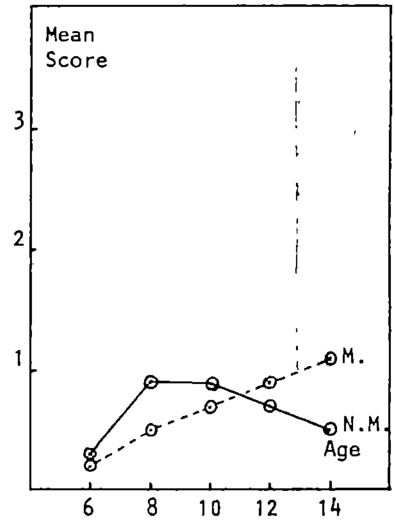


Figure 4

USE AND DESCRIPTION RESPONSES



Age and occupation, as hypothesised, emerge as significant main effects for both Abstract and Total responses. The hypothesised furthei joint effect for age and occupation is also confirmed in both cases, though more strongly for Abstract than Total responses, where the additional contribution is quantitatively slight. Indeed, by comparison with the major age effect the further contributions from occupation and age-by-occupation are both modest, even for the Abstract category.

For both categories the null hypothesis for sex is rejected in favour of the conclusion that boys show a slight but significant overall superiority to girls. The small but significant addition from the quadratic age component for Abstract responses indicates that linear age effect is subject to some slight curvature.

Of the remaining categories, Inferior Explanation shows the strongest age effect, followed by Illustration, Use, and Use and Description. The quadratic age effect for Repetition is also present for Description and Illustration. The quartic age-by-occupation addition indicates a particularly complex interaction pattern for the Use and Description category.

The varied patterns may be observed in Table 3, where category mean scores and standard deviations are presented by age, occupation and overall. For example, the age means for Repetition and Use are seen to peak at age 8; whereas Description peaks at age 10. And though Illustration declines consistently with age, the decline is accelerated from ages 6 to 8.

The patterns of development for occupational group mean scores are illustrated in Figures 1–4 for those categories, including Total responses, for which both occupation and age-by-occupation effects were significant. The complex age-by-occupation interaction observed in Table 2 for the Use and Description category is seen in Figure 4 to take the form of a with-age reversal in the occupational group means. The non-manual group means are the greater to age 10, with the manual group means higher thereafter. The non-manual group means are highest at ages 8 and 10, whereas the manual group means increase steadily throughout.

After Abstract responses, Use responses occur most frequently overall and, again after Abstract responses, are most subject to age-by-occupation interaction. Use is the most popular category for all 6-year-olds and for 8-year-olds of manual fathers. Use is also more popular with manual than non-manual groups at all ages but 6.

DISCUSSION

The factor analysis confirmed that different markers could reliably classify vocabulary responses under 10 descriptive headings and that two of these headings, Synonym and Explanation, could be combined as Abstract responses. The analysis also showed that Abstract responses and Total responses were closely interdependent. Over the 6 to 14-year-old age-span just over 50 per cent of responses were classified as Abstract. Nevertheless, with a correlation of 0·95 between Abstract and Total responses, the former accounted for 90 per cent of Total score variance.

This close age-parallel between growth in quantitative vocabulary and increasing preference for more abstract forms of definition is in keeping with the findings of Feifel and Lorge (1950) and Storck and Looft (1973). These authors have suggested that the age-patterns for types of definition resembles the successive cognitive stages of ‘ concrete ’ and ‘ formal ’ operations outlined by

Piaget. Thus, it would seem that a preference for 'concrete' forms of definition up to age 8 is succeeded thereafter by an increasing ability to produce more 'formal' responses.

The occupational group differences, independently of age, are again in keeping with the empirical evidence for both quantitative and qualitative vocabulary. Thus, the children of non-manual fathers offered a greater number of Total and Abstract responses than children of manual fathers, whereas the children of manual fathers offered a greater number of Use and Illustration responses than the children of non-manual fathers. These differences emerged although no attempt was made to select extreme occupational groups. They emerged also despite the somewhat arbitrary basis of occupational grouping whereby farmers, for example, were conventionally classified as non-manual.

The tendency for occupational group differences to increase with age had been observed by Jahoda (1964) for quantitative vocabulary. This effect was hypothesised and confirmed for abstract-type responses in the present study. It was hypothesised on the basis that if Bernstein's distinction between the semantic contexts of working-class and middle-class language usage is valid, the effect should be more strongly detectable for certain forms of definition than for undifferentiated vocabulary.

This proved to be so, in that the patterns of interaction between age and occupation varied considerably for types of response. For example, the interaction effect was progressive for Abstract and Use responses, but non-linear for Use and Description responses in combination. It was accompanied by increase with age in Abstract responses, decrease after age 8 in Use responses, and increase followed by decrease with age in Use and Description responses. The net effect of combining these types of response in Total vocabulary was, therefore, to obscure divergent patterns of interaction.

Bernstein (1971) has suggested that the more particularistic orders of meaning of working-class children's language may be in conflict with the language values and curriculum of the school, with the result that the working-class child may be at a considerable disadvantage in relation to the total culture of the school. Wiseman (1968), in a discussion of the educational effects of disadvantageous environmental factors, has pointed out that such effects may be cumulative over the years of school attendance.

Labov (1969), on the other hand, has criticised the concept of verbal deprivation on the ground that it is based on the results of conventionally administered tests that underrate the verbal competence of working-class children. Cazden (1972) has suggested that lower-class children may be especially constrained in a test situation, and Ginsburg (1972) cites studies by Zigler and Butterfield (1968) and Hertzig *et al.* (1968) as evidence that poor test motivation can lead to IQ underestimation for young children whose culture is person- rather than task-oriented. Moreover, the 'ordinal' interaction between style shift and social stratification, observed by Labov (1970) for samples of natural speech, might, if extrapolated to the vocabulary test situation, be taken to support the hypothesis that forms of definition are perceived on two gradients : the social background of the respondent and his perception of the expectations of the tester. Thus, so the argument might run, the middle-class child, being more attuned to the educational expectations of schools and testers, is the more likely to produce 'superior' responses.

Within the constraints of its methodology the present study has shown that abstract-type definitions can be distinguished as the major source of variation in children's definition vocabulary over the 6 to 14-year age-span. Though it would be misleading to conclude that particular forms of definition are peculiar to any age or group, it has also been shown that children of non-manual and manual fathers manifest differing rates of responding with age for those forms of definition that show the strongest pattern of development with age.

The argument that such group differences are an artefact of a test situation which is biased in favour of the middle-class child remains unanswered. Its experimental confirmation would require the presentation of word-definition tasks in ways which would take account of those situational effects traditionally presumed to have been held constant in the standardised test situation.

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A COMPARISON OF THREE METHODS OF EVALUATING TEACHING PERFORMANCE IN A COLLEGE OF EDUCATION

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SUMMARY. 196 Teacher's Certificate students were assessed on their penultimate teaching practice by 67 supervising tutors. The students were divided into three comparable groups and were supervised by three comparable groups of paired tutors. After three-and-a-half weeks each student was graded (A to E) by two tutors independently. Each group of tutors used one of three assessment methods: *Analytic*, involving reference to uniform criteria in the context of a graphic-style rating scale; *Profile*, involving a rating scale with a less tightly organised procedure; and *Global*, in which tutors made no reference to uniformly agreed criteria. The results suggest that the Analytic method represents a clear improvement over the other two methods in a number of respects.

INTRODUCTION

THE broad aim of this research study was to provide comparative data which might help to evaluate the reliability and validity of three different methods of assessing teaching performance in a college of education. The methods were styled: Analytic, Profile and Global.

Reliability was examined in the main by reference to the level of inter-rater agreement (i.e., the degree of agreement between the grades assigned by different tutors for the same students). *Validity* was examined by comparing the research grades with the grades awarded two terms later in the students' final, and externally moderated, teaching practice. Although these final grades do not represent ideal criteria since, for example, they are separated in time and in 'teaching environment' from the original grades, they do have the advantage of offering a professional judgment about the students' capabilities in a teaching situation which is external to the research setting. It seems reasonable to argue, therefore, that such estimates might serve as useful indicators of the validity of the research grades which were similarly intended to provide estimates of the students' teaching capabilities. The final teaching practice grades also seemed preferable to the re-use for validity purposes of the reliability data, as has sometimes been suggested (see Ryans, 1960).

Following the arguments of Vernon (1953), the hypothesis was advanced that reliability and validity would be greatest for grades allocated by tutors using the Analytic rating scale which employs clearly defined criteria and a very specific grading procedure and least for the grades allocated by tutors using the Global procedure which utilises no uniformly agreed criteria.

METHOD

Three groups of students were formed each supervised by one of three groups of tutors. The student groups were arranged so that they were broadly comparable in relation to a number of variables, e.g., sex, age, main subjects, age range and previous teaching practice grades. Random allocation of students to schools and tutors to students was, of course, not feasible due to practical limitations in organising teaching practice. Each student was supervised by two tutors: a general (i.e., main subject) tutor and an education tutor, and these tutor pairs were randomly assigned to one of three assessment procedures—analytic, profile or global. The practice was the second of three practices and lasted five weeks. Students were graded after three-and-a-half weeks on the usual five-point literal scale (A–E). Grades were allocated by each tutor independently, without discussion after either two or three periods of actual classroom observation.

Subjects.

196 college of education students in their second year of a three-year Teacher's Certificate course were allocated to the three assessment modes (60 to Global, 70 to Analytic and 66 to Profile), matched, as far as possible, on the variables mentioned above. Full details of the research design and findings are given in Povey (1974).

FIGURE 1

ILLUSTRATIONS FROM ANALYTIC AND PROFILE FORMS.
ANALYTIC ASSESSMENT FORM (one section only).

CLASS MANAGEMENT
This should include consideration of a student's ability to handle the whole or part of the class as a group.

A	B	C	D	E
Handles class in relaxed yet firm and purposeful manner. Timing and clarity of instructions excellent. Discipline for the most part not externally imposed but achieved by good rapport and skilful organisation of activities.	Efficient and fairly relaxed approach to class management. Does not over-emphasise externally imposed discipline. Timing and clarity of instructions good.	Handles whole class adequately. Situation may become a little out of hand occasionally but shows ability to restore control. Timing of instructions satisfactory.	Weak and indecisive approach to class management. Distinct tendency for situations to become out of hand and difficulty in regaining control. Timing poor.	Excessively lax or inconsistent discipline. Totally inadequate rapport with children in activities involving whole class. Situation frequently out of hand and attempts to restore control generally ineffective.

Tutors were asked to encircle one of the grades (A to E) in each of the five sections of the rating sheet and to calculate an overall grade (A to E) by taking the average of these five separate grades.

PROFILE ASSESSMENT FORM (one section only).

CLASS MANAGEMENT
Consideration of student's ability to handle the whole or part of the class as a group.

Purposeful, secure		v		lax, indecisive
A	B	C	D	E

Tutors were asked to indicate their rating by placing a tick in each section at any point along the continuum (i.e., a tick might be placed not only at one of the five discrete grading points—A, B, C, D or E—but also in the spaces between grades.

They were then asked to arrive at an overall grade in the light of the resulting profile of the student's teaching performance, but without averaging the grades in the same specific ' mathematical ' sense involved in the Analytic procedure.

The Assessment Forms.

The Analytic method involved the use of a graphic-style rating scale in which tutors assigned grades by reference to uniform and specifically defined criteria (see Figure 1). The Profile method involved reference to uniform criteria but with a much smaller degree of specificity in definition and rating procedure. Heim, Povey and Watts (1965) have described a similar rating procedure. In the Global method, tutors assigned grades without reference to any specified criteria. The areas of teaching performance selected as the basic reference points for the rating scales were : Relationships, Organisation, Content, Class Management and Presentation following the work of Ryans (1960).

RESULTS

The main point of interest in relation to the scatter of scores (see Table 1) concerns the observation that mean scores and standard deviations for the two tutors are closer where the Analytic method had been used than for the other methods.

An incidental finding of interest reported more fully elsewhere (Povey, 1976) concerns the relationship between students' travel arrangements and the distribution of grades, students placed in lodgings for the duration of the practice tending to be given a higher proportion of above average grades and a lower proportion of below average grades when compared with students travelling to school from home or college ($P < \cdot 05$ on chi-squared test).

TABLE 1

MEANS, STANDARD DEVIATIONS AND AGREEMENT BETWEEN GRADES.

Assessment Method	Tutor	Mean	SD	Percentage Agreement
Global (N=60)	Education	3·12	0·69	48·3
	General	2·92	0·89	
Analytic (N=70)	Education	3·27	0·74	54·3
	General	3·27	0·76	
Profile (N=66)	Education	3·44	0·73	48·5
	General	3·17	0·62	

NOTES : (1) Grades converted into a numerical scale (A=5).
(2) Percentage of students given the same grade by each tutor.

Reliability.

Table 1 also shows the extent of inter-rater agreement in the three groups. Although none of the differences between the groups is statistically significant the tutors' grades in the Analytic group show a distinctly closer level of agreement than the grades in the other groups on a strictly 'same grade/different grade' basis. The trend for closer agreement between tutors' grades in the Analytic group is also evident when considering the awarding of only B and C grades within which range the majority of discrepancies occurred.

When the scores from the Analytic and Profile rating scales are examined in detail, again the results for the Analytic group are impressively cohesive (see Povey, 1974, for fuller discussion on this point). The poorest level of inter-rater agreement on the rating scales was in the subsection dealing with the student's choice and understanding of *content*.

Some interesting findings emerged in relation to inter-rater agreement and a number of 'tutor variables.' For example, where tutors had been paired together on previous practices there tended to be a good level of agreement between the grades allocated in this project, whereas the agreement was less good between tutors who had not been paired previously ($P<0{\cdot}05$ on a chi-squared 2×2 test). It is also relevant to note that this trend was most pronounced in the Global group in which tutors were not using uniform criteria ($\chi^2=8{\cdot}06$ $P<{\cdot}01$), less pronounced in the Profile group ($\chi^2=2{\cdot}13$, NS) and least in the Analytic group $\chi^2=0{\cdot}58$, NS) in which most attention was paid to uniformity in grading procedure. Similarly, tutors who were paired with only a few colleagues for teaching practice supervision had fewer grade disagreements than tutors paired with a large number of colleagues ($P<{\cdot}05$ on a χ^2 test of association). Level of agreement between tutors' grades was also affected by the number of observation periods upon which the tutors' grades were based. In particular, there appeared to be a type of 'threshold point' at three visits. Where both tutors had observed the same student on three occasions there was was a distinctly improved possibility, in contrast to the two-visit situation, that they would give the same grade. The association between poor grade agreement and two observations each and good agreement and three observations each is significant on a 2×2 chi-squared test ($P<{\cdot}01$).

Another variable affecting grade agreement was the type of age range involved. There was a pronounced tendency for tutors supervising mainly secondary-based students to have a high proportion of grade disagreements and for tutors supervising mainly primary-based students to have few grade discrepancies ($P<{\cdot}001$ on a χ^2 test of association). Tutors supervising in secondary schools tended to find poor agreement over their grading for secondary students in the sub-sections on the Analytic form dealing with Organisation and Class Management. Tutors supervising students in primary schools, on the other hand, showed good agreement in these areas. The comparison between primary placement and a high proportion of agreed grades and secondary placement and a low proportion of agreed grades in relation to these two areas of teaching performance reached the $P<0{\cdot}05$ level of significance on a chi-squared comparison. For some reason inter-rater agreement was also affected by the sex of the student, tutors agreeing grades for women more readily than for men. The association between agreement of grades for women students and disagreement for men students is not evident in the results of the Analytic group but it is strongly evident in both Global and Profile groups ($P<{\cdot}05$).

Validity.

The Analytic grades showed by far the closest correspondence of the three sets of grades with the final year teaching practice results for the same students. For example, a comparison of the grades agreed by tutors for students in the Analytic group with the final year grades yielded a correlation coefficient of 0·58 which was significantly higher than the comparable coefficient (0·32) obtained from a comparison of the grades of students supervised by tutors using the other two methods ($P<{\cdot}05$). The results also compare very favourably with the coefficient of correlation (r= ·40) between second and third year teaching practice marks in a piece of research with Certificate of Education students reported by Crocker (1968). These coefficients should be viewed with caution, however, since the correlation coefficient is not an entirely adequate measure for use in relation to these data, as I have argued elsewhere (Povey, 1974). Nevertheless, the trend of the results is clearly supported by chi-squared comparisons and this gives added confidence to the belief that they represent reasonably meaningful comparisons. There is also a clear and generally consistent trend in the results of the correlation coefficients and chi-squared tables which indicates that the *combined tutors' grades* bear closer relationship to the final year results than either the education or general tutors' scores taken separately.

The results also support the view that grades awarded on the basis of three or more periods of observation are more ' valid ' than grades awarded on two or fewer. Thus, taking the final third year grade as the ' validity ' criterion, one finds a significant association between a large number of observation periods and good agreement between the research and final year grades and a low number of observation periods and poor agreement. Again, three periods of observation appear to represent a crucial threshold point. Comparing tutors' second year research grades with the final third year grades there is a clear association between two periods of observation and poor agreement and three periods of observation and good agreement ($\chi^2 = 5{\cdot}89$ $P < {\cdot}05$).

DISCUSSION

The evidence reported in this study relates to one college of education only and the results are not necessarily applicable, therefore, to other colleges or other teaching practice situations. On the other hand, the college in which the experiment took place is a fairly typical college of education taking male and female students from all over the country and offering a wide range of main subject courses. Similarly, the teaching practice arrangements and the assessment procedures adopted by the college tutors accord with those followed by many other colleges. Thus, there is a reasonable likelihood that many of the findings discussed in this research would be applicable to other similar teaching practice settings.

In general, the results support the view that the Analytic procedure offers a significant improvement in several respects over the use in a college teaching practice setting of other rating procedures utilising rather less specific and clearly defined approaches (see Ellis, 1972). There is a distinct and compelling trend in the results in favour of the Analytic method as an assessment procedure which does not seem to be explained on the basis of imbalance in the composition of the groups or ' hidden variables ' of other kinds (Povey, 1974).

In relation to the reliability of the three assessment methods, tutors using the Analytic rating procedure gave the same overall grade for the same students in a higher proportion of cases than the tutors using the Global and Profile procedures and there was an extremely close relationship between the *total scores* awarded for the same students by the education and general tutors on the Analytic scale. To this extent, therefore, the hypothesis that the closest level of agreement between the tutors' grades should be seen in the procedure utilising the most uniform criteria and the most tightly organised grading procedure has received some support. The Profile rating scale, however, which also utilised uniform criteria but with greater degree of flexibility in the grading procedure, did not show any consistent improvement over the Global approach in which tutors made no specific reference to uniform criteria. In comparison with the much more tightly organised Analytic procedure it seems probable that the greater degree of flexibility in the Profile procedure neutralised to some extent the effect of tutors' reference to uniform criteria in allocating their grades.

The main strength of the case for the general superiority of the Analytic rating scale over the Profile and Global procedures, however, does not come simply from the comparison of tutors' overall grading but from the all-round support received for this procedure from a widely varied range of findings. For example, it seems likely that the use of uniform criteria and a specific grading procedure have helped to produce in the Analytic group a much more cohesive pattern of grade allocation than is evident in either of the other two groups (Table 1). Similarly, the use of the uniform grading procedure seems to help to increase the objectivity of tutors' assessments by reducing the influence of some extraneous variables upon them. Thus, the only group of tutors for which the sex of the student was not significantly related to the level of inter-rater agreement was the group using the Analytic rating scale. Similarly, the effect of previous tutor-pairing arrangements on level of inter-rater agreement was greatest in the situation in which tutors were not referring to uniform criteria (Global) and by far the smallest in the Analytic group which utilised the most uniform procedure.

The finding that tutors tended to disagree rather more frequently about the grades to be awarded to students in secondary than in primary schools probably relates to specific assessment problems which are inherent in the secondary as opposed to the primary school setting. It is likely, for example, that a student practising in a secondary school will see rather more classes and teach in rather more diverse teaching situations than his primary 'class-teacher-based' colleague. Thus, it is likely that tutors visiting students in secondary schools will observe dissimilar teaching situations on different occasions rather more frequently than tutors observing students in primary schools. The finding that education and general tutors tended to disagree most frequently on the question of *content* of the teaching programmes is almost certainly related to the differences between such tutors' perception of the teaching situation. For example, one tends to find amongst college tutors an element of polarisation along the dimension 'subject-based-specialist' *versus* 'child-centred-general-practitioner' and this polarisation is likely to show itself in the different weighting tutors attach to the various aspects of teaching performance (cf. Percy, 1972). The evidence that, on this five-week practice, grades based on three or more periods of classroom observation tend to be more reliable and valid than grades based on two or fewer is also of interest. This suggests, as I have argued elsewhere (Povey, 1974), that the tutor may be left with certain conflicting viewpoints after his first two visits and the third visit may act as an important 'resolution visit.'

In relation to the 'validity' data the Analytic procedure again appears to maintain the all-round strength of its case as a more useful method of assessment than the Global and Profile methods. Thus, despite the acknowledged hazards in using grades awarded on a later teaching practice as the 'validity criterion,' it seems reasonable to argue that the Analytic procedure has contributed towards an improvement in this aspect of the tutors' grades. The results also suggest that there may be considerable merit in combining the grades independently awarded by different tutors. The resulting assessments in the present research provided in general an improved level of agreement with the validity criterion when compared with the level of agreement obtained by taking the individual tutors' grades separately. This finding is also well in line with previous work which has shown the superiority of combined ratings over single ratings (see discussion in Evans, 1951 ; also Wiseman, 1949).

Since the conclusion of this particular experiment the Analytic rating sheet has been amended in certain ways in the light of tutors' experiences and the research findings. The revised form now includes an additional section on *Achievement.* This section requires tutors to offer an evaluation of what pupils have learnt during the practice and to consider the relationship between the pupils' progress and the student's teaching objectives. The *Organisation* section has also been subdivided so that one subsection deals with the organisation of the student's own work (including the teaching practice file) and the other with his organisation of the children's activities. The criteria utilised in the Analytic assessment form have also formed the basis for much of the pre- and post-practice discussions between tutors and students, thus helping to demonstrate the essential relationship between teaching objectives, performance and evaluation. The revised form has been used by a restricted number of tutors in a recent teaching practice as a preliminary to using the form in a full-scale practice in spring, 1975. Further data have also been collected from an experimental investigation comparing tutors' assessments on the Analytic Rating Scale with measures of ' pupil learning.' These will be reported at a later stage.

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INDIVIDUAL DIFFERENCES AND COURSE PERFORMANCE

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SUMMARY. The relationship of several individual difference variables to achievement in college courses was investigated, using a sample of 500 freshmen and sophomores taking introductory psychology. Previous grades, degree of concordance between student preference and actual course conditions, and facilitating anxiety were found to explain 82 per cent of the variance in test performance. The importance of assessing student preferences in academic planning is discussed.

INTRODUCTION

INDIVIDUAL difference variables which have been related to student performance in college courses can be divided into two general categories. The first such category consists of intellective factors and includes general intelligence tests, measures of intelligence specifically designed for predicting college success, such as the Scholastic Aptitude Test, and measures of prior scholastic performance, such as grade-point-average (Horst, 1959). The second major category is that of non-intellective factors, including (1) demographical variables, (2) anxiety variables, and (3) need achievement (n-Ach) variables.

Previous academic achievement consistently emerges as the best single predictor of college grades (Swenson, 1957 ; Astin, 1971). However, it accounts for less than one-half of the variance in predicting scholastic performance (Sanford *et al.*, 1969). The major demographical variable which has consistently shown to have a significant effect on the prediction of academic performance is sex, with females having higher college scholastic achievement than males (Jackson, 1955 ; Hoyt, 1959 ; Northby, 1958 ; Gerritz, 1959 ; Astin, 1971).

Research assessing the effects of anxiety upon the level of academic performance has demonstrated that general measures of anxiety are not directly useful for predicting academic performance (Klug and Bendig, 1955 ; Spielberger and Katzenmeyer, 1959 ; Grooms and Endler, 1960 ; Sarason, 1961). However, some evidence suggests that specific measures of anxiety, such as test-taking anxiety, are significant predictors of academic performance (Alpert and Haber, 1960 ; Dember *et al.* ,1962). Moreover, it has been found that specific anxiety measures, in combination with intellectual measures, often increase prediction of academic performance (Sanford *et al.*, 1969).

Several studies have supported the notion that need for achievement ' n-Ach ' plays a role in predicting student performance in college courses and in psychology courses in particular (Weiss *et al.* 1959; Robinson, 1964; Meyer, 1965; Heckhausen, 1967). However, the results are far from unequivocal and some studies have failed to find a relationship between ' n-Ach ' and academic performance (Walter, 1957; Haber, 1957; Molikan, 1958; Atkinson and Litwin, 1960 ; Mitchell, 1961).

Some of the difficulties in obtaining reliable results and in predicting more than 50 per cent of the variance in academic achievement may be a function of the lack of control for (1) individual instructor effects, (2) the interaction between instructor and teaching method, (3) a lack of a consistent measure of the amount of information learned by students, and (4) a failure to consider the degree of correspondence between student preference for particular course conditions and those to which the student is actually exposed. The present study investigates the role of individual difference variables, in the prediction of academic success across three variant teaching methods and two variant schedules of evaluating scholastic achievement. To remedy previous inadequacies, (1) the same instructors were utilised across all testing and teaching methods within one 14-week semester and (2) the amount of information learned was measured by giving the same examination questions, both in number and in content, to all students in each of the conditions. It was hypothesised that under this controlled procedure, the variance previously accounted for by intellective and non-intellective variables in predicting academic performance would be increased. Further, the addition of an instrument which measured the degree of correspondence between student preference for a given set of testing and teaching condition and those to which students were actually exposed was expected to add significantly to the prediction of achievement in the course.

METHOD

Subjects

The participants were 500 undergraduate students in one of two daytime courses in introductory psychology at the University of Houston. The course was a requirement for those students majoring in psychology, although it was open both to majors and non-majors. The majority of those students who registered for the course were freshmen and sophomores. All students in the course participated in this study.

Teaching Conditions.

There were two weekly meetings of the introductory psychology course in a 14 week-long semester. First, all of the students received a weekly one and one-half hour lecture. Second, all students were randomly assigned to a smaller weekly group meeting. Three of these smaller groups participated in a laboratory in which psychology experiments were conducted by the students ; two groups received a second weekly lecture, and the remaining two groups received weekly discussions of ongoing research by faculty members and graduate students.

Testing Conditions.

Two schedules of testing were utilised for each of the three teaching methods. One schedule consisted of weekly tests covering material presented in the textbook and in the weekly lectures (attended by all students). Half of the students in each teaching condition received a 15-item multiple-choice test each week. The other half of the students were tested with one 90-item multiple-choice in the middle of the course and one 90-item multiple-choice at the end. These tests consisted of the same questions which were presented on the weekly tests.

Individual Difference Variables.

The current college grade point average of each student and the Verbal and Mathematics scores on the Scholastic Aptitude Test were obtained from university records. Demographical variables such as the age, sex, marital status, current employment, year in college, and college major of each student were collected by a biographical data sheet distributed at the beginning of the semester. The Achievement Anxiety Test (Alpert and Haber, 1960) was used to provide scores on two independent scales of anxiety. One form of anxiety facilitates, while the other debilitates, a student's performance in classroom examinations. The instrument was scored according to the system developed by Alpert and Haber (1960). A need for achievement score, as well as a need to avoid failure score, were obtained for each student from responses on the French Test of Insight (French, 1958). Administration and scoring was conducted according to standard procedures for group administration outlined by French (1955).

A scale of concordance was developed to measure the degree of correspondence between the actual conditions of the introductory course and each student's own preferences regarding how the course should be conducted. It consisted of nine forced choice items including statements reflecting course format, course content, testing procedures, and grading systems.

Four of the items required preference choices between the course as conducted for that student and alternative methods, which were being used with other participant students. Five of these items required choices between the course as conducted for all participating students and alternative methods not employed in this study. In addition, the student was asked to rate how important each choice was to him on a Likert scale ranging from 0 (' not important ') to 5 (' very important ').

The nine course conditions for which the student indicated a preference were compared to those teaching conditions in which he was a participant. In the scoring system −1 was assigned to those preferences the student did not actually receive and +1 was assigned to those preferences the student received. In addition, each choice received a weight from 0, indicating not important, to 5, representing great importance. Received preferences were multiplied by their assigned weights; those preferences not received were also multiplied by their assigned weights. The result of these calculations were two independent scales, a Concordance Scale, indicating the degree to which each subject's preference for teaching conditions coincided with his actual treatment, and a Discordance Scale, indicating the extent to which each subject's preference for teaching methods was not met by the experimental condition in which he participated.

Outcome Measure.

Academic performance was measured by those criteria set up in the course for the grading procedures. Grading was determined exclusively by performance on non-cumulative multiple-choice examinations. Hence, academic performance, or the amount of information about psychology acquired by the student in the course, was measured by the total number of correctly answered questions on course examinations.

RESULTS

The results were analysed using the statistical package for the Social Sciences computer program (Nie *et al.*, 1970). The number of subjects in the regression equation was reduced for three reasons. First, those students who dropped the course (approximately 10 per cent) during the semester could not be included in the same analysis with those students who remained in the course. Secondly, those students who were not present on the first day of class when the assessment instruments were administered, specifically the Concordance Scale, could not be included in the same analysis as those who were present. It was essential that the Concordance Scale be completed prior to the students gaining knowledge about the course conditions in which they were participating, so as not to contaminate their attitudes with the knowledge of what they were actually going to experience. Thirdly, acquiring information on certain variables, such as GPA and SAT Verbal and Mathematics scores, was hampered by the fact that some students did not have current college grade-point averages (one reason being that many of the students were first-semester freshmen), and by the fact that SAT Verbal and Mathematics scores were not mandatory entrance requirements for students at the university ; as a result, these scores were not available for all students. Hence, the total number of subjects in the regression equation was reduced when the necessary instruments were unavailable.

Table 1 presents the stepwise multiple regression analysis predicting the number of correctly answered questions on course examination. The table includes only those predictor variables that add significantly ($P<\cdot 05$) to the multiple correlation when entered in the stepwise procedure. Those predictor variables which did not add significantly ($P<\cdot 05$) to the multiple correlation : sex, SAT Verbal and Mathematics scores, debilitating anxiety, need for achievement and discordance, are not included in the table.

The multiple correlation coefficient for the number or correctly answered questions on course examinations is highly significant ($R=\cdot 91$, $F=188\cdot 03$, $df=3, 116$, $P<\cdot 001$), and a substantial amount of the criterion variance is accounted for by the predictors. The patterning of beta weights for the number of correctly answered questions on course examinations is :

$$R=\cdot 72\ \text{GPA}+\cdot 70\ \text{Concordance}\ -\cdot 09\ \text{Facilitating Anxiety.}$$

TABLE 1

STEPWISE MULTIPLE REGRESSION ANALYSIS PREDICTING SCORES ON MULTIPLE-CHOICE TESTS.

Step Entered	Predictor	F	df	R
1	I Grade-Point Average	63·13	118	·59
2	II Concordance	309·68	117	·90
3	III Facilitating Anxiety	5·48	116	·91

Therefore, the amount of information which students learned in the introductory psychology course, as measured by correct test-item responses, can be best predicted by a knowledge of (1) previous college grade-point-average, (2) the degree of correspondence between the specific teaching methods and course conditions and student preferences for such, and (3) that amount of anxiety which facilitates test taking.

Multiple regression equations were generated reflecting the interaction of those individual difference variables, previous college grade-point-average, degree of Concordance, and facilitating anxiety, in predicting academic performance, as measured by the number of correctly answered questions on course examinations. No significant interaction effects were found.

DISCUSSION

The results of the present study may be summarised as follows : (*a*) the amount of information which students learned in the introductory psychology course, as measured by the total number of correctly answered questions on course examinations, can best be predicted by a knowledge of previous college grade-point-average, the degree of correspondence between the specific teaching conditions and student preference for the types of methods employed, and the amount of facilitating test anxiety ; (*b*) predictions based on these variables can explain up to 82 per cent of the variance in test performance ; and (*c*) no significant interaction effects were between those individual difference variables, previous college grade-point-average, Concordance and facilitating anxiety, which significantly added to the prediction of student scores on course examinations.

The results of the present study are consistent with prior research which has shown that previous academic performance is the best predictor of current academic performance (Swenson, 1957 ; Horst, 1959 ; Sanford *et al.*, 1969 ; Astin, 1971). Since grades assigned in college courses are primarily based on course examination performance, at least at the introductory level classes, it is not surprising that past performance is a significant predictor of future examination performance. The capacity to score well on tests in college is in part a function of a general achievement level, but it is also in part a function of learning the skills of how to acquire the information and knowledge which are peculiar to examinations in college courses. As a predictor, previous college grade-point-average combines these two components, both of which are necessary for a student's success in future college academic endeavours.

Concordance, a measure of the degree of correspondence between a given set of testing and teaching method and student preference for such procedures, added significantly to the prediction of the number of questions students answered correctly on course examinations. Previous college grade-point-average alone accounted for 35 per cent of the variance ; however, when previous college grade-point-average is considered in combination with Concordance, the explained variance increases to 82 per cent, thereby emphasising the powerful influence of Concordance as a predictor of student performance on course examinations. Hence, it appears that if one wants to predict a student's academic achievement in a college course, as measured by performance on course examinations, one can present to the student the possible ways in which a course could be taught within a given system, and ask the student to choose those testing and teaching methods by which he feels his own learning can be maximised. The student himself seems to be a good thermometer of his own capabilities within a specified system of teaching. Therefore, to maximise learning, one needs to include in their consideration of appropriate educational methods a measure of the student's own preferences with respect to testing and teaching conditions.

The only non-intellective variable which added significantly to the multiple correlation was facilitating anxiety. Surprisingly, facilitating anxiety had a low negative beta weight, while Sanford *et al.* (1969) reported the significant effect of facilitating anxiety with a positive beta weight and debilitating anxiety with a negative beta weight. Suspecting a possible interaction between facilitating anxiety and the other significant predictors, equations reflecting the interactions of these variables were generated. There were no significant interaction effects. Another possible explanation for this finding rests in the specific difficulty level of those test items on the course examinations. One might hypothesise that the greater the difficulty of the test items, the less likely will facilitating anxiety have a positive effect on test performance. In this study, the total number of possible examination points that could be earned was 180 ; the mean score being 111—a somewhat low average. Conceivably, students may report having fair amounts of anxiety which facilitate their test taking, but if the items on the tests are simply beyond their cognitive abilities, no amount of facilitating anxiety will enhance their performance. In fact, difficult test items may serve to frustrate the same individual who previously utilised his state of test arousal to his benefit.

The other remaining non-intellective variables, sex and need for achievement, were not significant predictors of academic performance. This study adds to the already existing body of literature which debates the usefulness of these predictors. With respect to need for achievement, studies have shown that there does not seem to be an accurate, reliable way of measuring the construct (Molikan, 1958; Atkinson and Litwin, 1960; Mitchell, 1961). Perhaps in the future, measurement could be facilitated by the development of an instrument which would quantify need for achievement in terms of a specific state, in this case, those motivations and goals directly associated with the academic setting.

In summary, the results of this study suggest that the student, even in an introductory level course, can serve as a valuable source in assessing those conditions which will facilitate his/her learning. Further research is needed, not only to measure the stability of Concordance as a significant predictor, but also to encourage the initiation and evaluation of the application of this finding. If within any given system of educational opportunity, students can, at least to some extent, participate in the testing and teaching methods of their choice, academic achievement should be significantly enhanced. These findings would imply that neither the manipulation of testing and teaching method, nor student preference alone will be sufficient to facilitate academic performance, but rather an accurate measurement of the degree of correspondence between these variables may be the essential component necessary to maximise learning for the student.

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PERSONALITY DIFFERENCES BETWEEN BOTH INTENDED AND ACTUAL SOCIAL SCIENCES AND ENGINEERING MAJORS

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SUMMARY. The Maudsley Personality Inventory was used in a search for personality differences between 139 social science and 328 engineering upperclassmen. Social science majors scored significantly higher than the engineers on the neuroticism scale. A second study of 454 high school seniors showed that those who indicated a preference for a social science major also scored significantly higher on neuroticism than high school seniors who wanted to major in engineering. The results were interpreted to mean that social science and engineering attract different types of people. The over-representation of social science majors and under-representation of engineers in radical political groups was discussed from the point of view of the personality factors influencing the choice of majors.

INTRODUCTION

DAVIS (1965) reports that the career decision process is well under way by the time a freshman enters college and that career changes in college are between alternatives that are compatible with an underlying ability and value structure. One indication of the importance of such variables is found in the non-random distribution of changes in college major. For example, about 49 per cent of freshman engineers change majors before graduation and 43 per cent of this group change to business whereas only 2 per cent change to the social sciences. While 64 per cent of freshman social science majors change careers, 36 per cent of those changing move to education, while only 1 per cent go to engineering. There is very little movement across these scientific disciplines and this is because each freshman's career choice has been affected somewhat permanently by his " previous environment, sex role, intellectual ability, and occupational values " (Davis, 1965). The purposes of the present research were twofold. First, the study sought to determine if personality traits could be added to the above list of correlates of occupational choice in college students. A second purpose was to determine if any of the obtained personality differences between students in different college majors were due to exposure to different college curricula, or, alternatively, if the differences were entirely the result of different personality types choosing different majors.

Cooley and Lohnes (1968) discovered that post-college career plans could be predicted from knowledge of twelfth-grade abilities and motivation. Since the obtained level of prediction did not exceed that obtained by just asking the 12th-grader what he wanted to become, perhaps a more productive way to utilise information on personality differences between groups of college majors is in an effort to understand the behaviour of the individuals within a college major. In this report a beginning is made in this direction by relating obtained personality differences to the marked differences between engineering and social science majors in involvement in campus disruptions (Keniston, 1969).

Personality Measures.

Wiggins (1968) describes the traits of extraversion-introversion and neuroticism as the ' big two ' in the trait approach to personality. Whenever

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personality questionnaires, however derived, are factor analysed these two traits emerge as large factors showing stability over time (Bronson, 1966 ; Cattell, 1963). Eysenck (1962) describes these two traits as follows : " extraversion, as opposed to introversion, refers to the outgoing, uninhibited, impulsive and sociable inclinations of a person. Neuroticism refers to the general emotional instability of a person, his emotional over-responsiveness, and his liability to neurotic breakdown under stress." The Maudsley Personality Inventory (1962) was utilised in the present search for personality differences between social science and engineering majors because it provides a reliable measure of extraversion and neuroticism.

STUDY ONE

Method.

The Maudsley Personality Inventory was administered to 296 junior and senior engineering majors from eight different mechanical, civil, aeronautical and electrical engineering classes. Since none of these engineering majors were women, the Maudsley was also mailed to all members of the campus women's engineering club. Thirty-two of the 58 native-born women majoring in engineering returned completed inventories. The composition of the total sample of engineers was 296 males and 32 females.

The social science sample (N=139) was drawn from two upper division psychology classes and included 113 majors in psychology and 26 majors in sociology, anthropology, history, government, and social work. Within this sample there were 80 males and 59 females.

Results.

The mean neuroticism and extraversion scores for the engineering and social science samples are presented in Table 1. All three groups of social science majors (males, females and total sample) scored significantly higher on neuroticism than the corresponding groups of engineering majors. There was no significant difference in extraversion scores. The means for each of these groups should also be compared to the general American college means of 20·7 for neuroticism and 28·7 for extraversion reported by Bendig (1962). This comparison indicates that the junior and senior social science majors had higher neuroticism scores not only than the engineers, but also than the average American college student. In the test manual for the Maudsley Personality Inventory (1962) mean neuroticism scores are reported for 32 samples. Twenty of these samples have mean neuroticism scores higher than the social science majors reported here but 18 of those 20 means are for groups of neurotics, psychopaths, or prisoners.

TABLE 1

MEAN PERSONALITY SCORES AND STANDARD DEVIATIONS OF ENGINEERING AND SOCIAL SCIENCE MAJORS.

Variable	Engineering			Social Science		
	Men (N=296)	Women (N=32)	Total (N=328)	Men (N=80)	Women (N=59)	Total (N=139)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Extraversion ..	25·5 (8·8)	30·3 (8·6)	26·0 (8·8)	25·6 (7·9)	26·9 (10·0)	26·2 (8·7)
Neuroticism....	21·9 (8·7) **	23·2 (9·7) *	22·0 (8·8) **	26·5 (10·4)	28·3 (9·3)	27·3 (9·9)

Significant differences between equivalent groups of engineering and social science majors are shown at the ·05(*) and ·01 (**) levels.

A major goal of the present research was to try to understand the behaviour of individuals within an occupational category by relating any obtained personality differences to behaviour and test correlates. This requires, as a first step, an understanding of what a high score on the neuroticism scale of the Maudsley Personality Inventory means. The high mean score for social science majors does not mean that a majority of them are neurotics, rather it means that there is a rather marked tendency for them to admit to anxiety proneness, being emotionally upset, and having a tendency to worry. This can be made clear by examining the test correlates of neuroticism. Bendig (1957) has reported very high correlations (around 0·8) between the neuroticism scale of the Maudsley Personality Inventory and the Manifest Anxiety Scale. Spence and Spence (1966) report that high scorers on the Manifest Anxiety Scale respond emotionally to moderately frightening or stressful situations. In a classical conditioning test subjects high on anxiety will condition faster because of their emotional response to the test situation. When the test situation is devoid of anxiety-inducing elements, high scorers on the Manifest Anxiety Scale do not condition faster than low scorers. Byrne (1964) reports high correlations between measures of neuroticism and his Repression-Sensitisation scale. This relationship is, perhaps, the most meaningful for the purpose of understanding a high score on neuroticism. High scorers on neuroticism are also ' sensitisers,' that is, they are sensitive to and try to understand their problems rather than repress or deny that their problems exist.

More sensitisers than repressors might possibly be drawn to the social sciences than to engineering. If that were the case, the existing differences between social science majors and engineering majors could be explained in terms of personality factors operating in the initial choice of a major. However, it is equally likely that, in the present samples of juniors and seniors, the social science majors have been exposed to two years of a curriculum that trains students to sensitise, whereas the engineering curriculum concentrates on other, more fact-oriented, approaches to education. This possibility was checked out in a second study.

STUDY TWO

Method.

A month after their high school graduation, 1,100 high school seniors were mailed the Maudsley Personality Inventory and a 30-item checklist of their anticipated college major. This checklist required that each respondent first indicate his plans for the following year. If those plans included college, the respondent chose an anticipated major from among the 30 majors listed. The respondent could avoid picking a major by checking the undecided category.

Four-hundred-and-fifty-four seniors (41 per cent) returned the questionnaires and, among the students planning to go to college (279), 19 had definite plans to enrol in engineering whereas 35 planned to enrol in psychology, sociology, anthropology, history or government, the same majors as in the social science group of college students. Only one of the 19 students planning to enrol in engineering was a female. Within the 35 planning to major in social science, 14 were males and 21 females.

Results.

The mean neuroticism and extraversion scores for these groups of students are presented in Table 2. The mean neuroticism and extraversion scores for these high school students indicated again that the total sample (males plus females) of social science students scored significantly higher ($P < \cdot 05$) on the neuroticism scale than the total group of engineers while there was no difference in extraversion. Although the mean difference in neuroticism between these two groups of high school males (5·1) was greater than the mean difference for the corresponding two groups of college males in the first study (4·6), the difference between the high school males was not significant ($P < \cdot 15$) because of the small sample size. Since only one high school female reported an intention to major in engineering, a statistical comparison of neuroticism scores of females in the two groups is impossible.

TABLE 2

MEAN PERSONALITY SCORES AND STANDARD DEVIATIONS OF STUDENTS INTENDING TO MAJOR IN ENGINEERING AND SOCIAL SCIENCE.

Variable	Engineering			Social Science		
	Men (N=18)	Women (N=1)	Total (N=19)	Men (N=14)	Women (N=21)	Total (N=35)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Extraversion ..	24·4 (9·2)	38	25·1 (9·4)	23·1 (8·8)	28·1 (8·6)	26·1 (9·0)
Neuroticism....	23·2 (8·8)	8	22·4 (9·2) *	28·3 (12·4)	29·1 (10·5)	28·8 (11·3) *

Significant differences between equivalent groups of engineering and social science majors are shown at the ·05 (*) level.

DISCUSSION

Although the differences in neuroticism between intended engineering and social science majors provide support for the hypothesis that the differences in neuroticism between engineering and social science upperclassmen are the result of different kinds of people choosing these majors, two problems need to be considered. The first concerns the 41 per cent return of completed inventories. Such a return always raises the possibility that the responding behaviour might be related to the dependent variables. However, if such a relationship exists, one would expect it to hold for both engineering and social science majors. If neuroticism was positively related to responding behaviour in social scientists one would not expect a negative relationship between neuroticism and responding among social scientists. At least, the authors know of no basis for such an expectation and, therefore, it seems reasonable to look upon the reported difference in neuroticism between intended engineers and social scientists as a true difference between these two groups.

The second problem concerns the near absence of women among the intended engineering majors. A more complete analysis of the relationship between personality and choice of college major would have been possible if this cell in Table 2 had more than one entry. Apparently very few female high school seniors desire engineering as a college major. However, given that the three comparisons of neuroticism scores between engineering and social science majors in Study One and two similar comparisons in Study Two indicated that social science majors scored approximately half a standard deviation above the engineering majors, it seems reasonable to predict the same result for any high school women intending to enter these two majors. We do know that the female engineering upperclassmen in the present study have a significantly lower mean neuroticism score than the female social science upperclassmen and that this result is also found for males where the evidence does indicate the influence of personality in the selection of a college major.

The large college drop-out rates and change-of-major rates noted by Davis (1965) did not operate to make the personality differences between college upperclassmen in different majors larger or smaller than the differences between high school students choosing these same majors. The mean difference on neuroticism was slightly over half a standard deviation in both the college and high school samples. Apparently dropping out and changing majors are unrelated to personality traits measured in this report.

If the results of the present investigation can be taken to indicate that psychologists, as a group, are different from any group of engineers, we are then faced with the question of what effect these personality differences have on both the professional and non-professional behaviour of both groups. In the non-professional area, Keniston (1969) noted very great differences in the proportion of student radicals coming from different college majors. The social sciences and humanities were over-represented among student radicals while students in engineering, business administration, agronomy, and education were under-represented. Other investigators have found radical activity to be correlated with certain personality traits. Silvern and Nakamura (1971) found that scoring in the direction of external control on Rotter's (1966) Internal *versus* External Locus of Control Scale was significantly correlated with protest activity and left-wing views. This finding can be related to the group differences in personality found in the present report by first noting that Phares (1973) and others have consistently found positive correlations between external control and a variety of measures of maladjustment. The particular measure of maladjustment used in the present report, neuroticism, is also related to external control.

In another investigation (unpublished) the authors administered both the Maudsley Personality Inventory and the Internal *versus* External Locus of Control Scale to 118 male and 141 female undergraduates enrolled in an introductory psychology course. These psychology students scored significantly ($P < \cdot 01$) more external than Rotter's 1966 norm group of college students and the correlation between the belief in external control and neuroticism was $0 \cdot 40$ ($P < \cdot 01$) for both sexes. If these correlations can be taken as indicating a general relationship between neuroticism and the belief in external control, the groups with high neuroticism scores will also score in the direction of external control. Since external control is correlated with protest activities and left-wing views, social science majors will be more likely than engineering majors to engage in radical activity. The most interesting implication of these findings is that behavioural differences (e.g., in radical activity) between social science majors and engineers may be relatively independent of what they are taught at college but significantly influenced by the personality traits predisposing high school students to choose these majors.

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UNIVERSITY STUDENTS : ATTAINMENT AND SPORT

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SUMMARY. The extent to which 230 university students following a one-year psychology course were 'active' (i.e., competitively or recreatively involved) in sport or 'non-participant' was compared with their scores on measures of personality, attitude, social class, sex, previous school involvement in sport, and attainment in university course work. Active students were, on average, more stable and extraverted, more likely to have been active in sport at school and were equally successful in course-work as non-participant students.

INTRODUCTION

BASICALLY this study is concerned with three questions: Firstly, what psychological and social factors distinguish students who are active in physical recreation and sport from non-participants ? Secondly, are students who participate in sport more, or less, likely to do well in university course work ? Thirdly, what relationships exist among personality, sport involvement and academic attainment ?

With regard to the first question, the factors which are examined here as possibly important in influencing participation in university sport include involvement in sport at school, social class and personality. Physical education and games can reinforce values of upper stream superiority, academic achievement and success (Start, 1966 ; Hargreaves, 1967) More recently, Reid (1972) has again pointed out that academically able pupils were over-represented in more prestigeful school activities and clubs such as choirs and sports teams. Such involvement might be interpreted as indicative of favourable attitudes towards school values and an adherence to achievement-motivation by these pupils. At the other end of the academic scale, for example, a large percentage of adolescents leaving school at 15 years of age claim that they will *not* continue any kind of physical activity in their post-school leisure (Emmett, 1971). In writing about the social factors which do influence young school leavers' physical recreation, however, Emmett concluded that love of sport is class-based, and that males lead a more active sporting life than females.

Taking the second question, Sutton-Smith (1963) has claimed that social learning in childhood influences the type of games played by the individual in adult life : a child whose parents stress achievement is more likely to be involved in games of skill and power. McClelland (1961), in comparing preliterate cultures, found that those high in need-achievement tended to play more competitive individualistic games. In modern society, such people show a major concern for doing well, with striving to attain or surpass some level of excellence. It might be hypothesised that this type of individual could be attracted towards sport and physical activities. But is such achievement-drive in the athletically 'active' university student reflected also in academic attainment ?

The third question was related to personality, and here there appear to be relationships among emotional stability, extraversion and general sporting ability (Warburton and Kane, 1966 ; Hendry, 1970 ; Kane, 1972). Yet, while stable extraverts are highly represented in sporting activities, introverts, " and possibly even neurotic introverts, predominate among outstanding students "

(Entwistle, 1972). It may, therefore, be interesting to ask if university students who are active in sport are more likely to be stable extraverts than non-participating students; and to examine the relationships that may exist among personality, sport and attainment.

Thus, the present investigation attempts to study the possible importance of social class, previous school involvement in sport, personality and attitude, in relation to students' participation in physical recreation at university level; to discuss whether or not students who are ' active ' in sport are at risk in their academic work; and to examine possible relationships among personality, academic attainment and sport.

METHOD

Subjects.

The subjects were students enrolled in a one-year psychology course which recruited both future psychology specialists and others following a general (Scottish Ordinary) degree course in the University of Aberdeen. The inventories and measures for this survey were included as part of the coursework (some prescribed, some voluntary), and in this way complete information on all measures was obtained for 96 men and 134 women, a 60 per cent coverage of the 385 students enrolled in the class. (Forty-seven additional students completed various parts of test battery, but they were omitted from the sample.)

Two factors influenced the percentage return of tests: normal student absenteeism and failure to complete the total test battery. To check the representativeness of the sample, comparisons were made between respondents and non-respondents, and no marked differences were found in catchment area (60 per cent of students from Scotland responded, 64 per cent of those from outside Scotland), or in sex (63 per cent of men responded, 59 per cent of women) or in an assessment of course work attainment. (Mean score for respondents 30·51, for non-respondents 30·42). It was not possible to follow up non-respondents with regard to ' sports involvement.'

Categories of participation.

On the basis of replies to a questionnaire about participation in sport at university; students were classified as:

Active—competitively: the individual represented the university in games, sports or physical activities. (This indicated a fairly high level of sporting performance, and in the case of team game players in the sample meant representing the first, and in a few cases, the second team.)

Active—recreatively: the individual took part in physical activities or joined sports clubs for reasons such as enjoyment, or health but *not* for representative competition.

(Both groups above covered a wide range of overlapping sports and physical activities, and in the main did not represent different forms of activity, though there were a few exceptions (e.g., horse-riding for recreation).)

or Non-participants: the individual had no involvement in sport or physical activities.

A check was made to ensure that no student was involved in activities outside university which differed *in kind* from the categories (presented above) in which he or she was placed.

Using the same kind of classification as above, students' previous participation in sports and physical activities at school was also ascertained. In the context of this paper ' sports,' ' games ' and ' physical activities ' were used interchangeably to indicate a wide range of pursuits from team games like rugby, individual sports such as gymnastics or athletics, physical activities like climbing and canoeing, racquet games such as squash, to contests like fencing or judo.

Measures.

The following measures were used :

(1) Eysenck Personality Inventory, Form A (Eysenck and Eysenck, 1964).

(2) Attitude to Physical Activity Scale, (Kenyon, 1972) which gives sub-scores for attitude to physical activity (*a*) as a social experience ; (*b*) for health and fitness ; (*c*) as the pursuit of vertigo ; (*d*) as an aesthetic experience ; (*e*) as catharsis : (*f*) as an ascetic experience ; (*g*) as games of chance.

(3) Social class on the basis of father's occupation and designated as 1—professional/managerial ; 2—other non-manual ; 3—manual.

(4) An assessment of course-work attainment : class course-work as assessed in stanine scores by Psychology Department staff in multiple choice tests, essays, and laboratory practicals, for both winter and spring terms were combined, and used as a measure of attainment in psychology.

Analyses.

The data were analysed both descriptively (see Table 1) and by multiple regression analyses, using course-work attainment as the dependent variable (see Table 2).

Multiple regression analysis is normally used as a broad-based technique for prediction from several variables in order to investigate the extent to which all the factors considered together account for variance in the dependent variable.

In the present study, however, this analysis was utilised in an attempt to examine the possible relationships of selected non-intellectual and social variables with successful course work at university in the light of course-work grades found within student sub-groups (see Table 1). The limitations of this exploratory technique, and the emphasis on non-intellectual factors (as against intellectual measures) are clearly acknowledged by the writers. The authors were not trying to advance the idea that there is a *direct* link between sport and academic success, but only to examine how far active sports participation may be compatible with academic success at university. Thus, any association would suggest an *indirect* link between sport and attainment. The independent variables used were : (1) extraversion ; (2) neuroticism ; (3) social class ; (4) school sports participation ; (5) university sports participation ; (6) seven attitudes to physical activity sub-scales (Kenyon, 1972). These were set against the measure of academic performance.

RESULTS

In attempting to discover possible differences between active and non-participant students in their social and psychological make-up, and in relation to course-work attainment, the results are presented in two sections to show : (*a*) social and psychological trends in sports participation ; and (*b*) non-intellectual and social factors associated with academic success.

(*a*) In considering variables linked to sports involvement, the relationship between personality and physical activities reported in the literature was upheld. Active students were more extraverted and stable than non-participants, with competitive students having, on average, highest extraversion and stability scores. In addition, women students had higher average neuroticism scores than men. (See Table 1.)

TABLE 1

SCHOOL PARTICIPATION IN SPORTS, SOCIAL CLASS, ACADEMIC ATTAINMENT AND PERSONALITY SCORES† OF COMPETITIVE, RECREATIVE AND NON-PARTICIPANT STUDENTS.

Variables	University Participation in Sports					
	Competitive		Recreative		Non-Participant	
	Men	Women	Men	Women	Men	Women
School Participation in sports:						
Competitive	12§	12§	28§	29§	10	13
Recreative	3§	1§	9§	29§	7	24
Non-participant	1§	1§	6§	9§	20	16
Social Class :						
Professional and non-manual	14	14	36	50	33	42
Manual	2	0	7	17	4	11
Academic Attainment	28·75 (8·29)	32·83‡ (5·29)	30·49 (9·17)	32·84‡ (7·50)	29·71 (7·25)	28·84 (6·45)
Personality :						
Mean extraversion	13·77‡	13·07‡	12·43‡	11·72‡	10·00	10·15
(SD)	(3·02)	(3·47)	(4·04)	(3·63)	(4·27)	(3·99)
Mean neuroticism	8·53	9·86‡	9·07*	11·42*	10·32*	12·42*
(SD)	(3·73)	(3·14)	(4·47)	(4·07)	(4·57)	(4·13)
N=	16	14	43	67	37	53

† Attitude scores available from the author.

§ Denotes $P<0·001$ between 'Actives' and Non-participants within sex groups by χ^2 for trend (Yates,1948).

‡ Denotes $P<0·05$ between 'Actives' and Non-participants within sex groupings.

* Denotes $P<0·05$ between men and women in same criterion groups.

In line with expectations, active students held more favourable attitudes to physical activity than non-participants in most of Kenyon's (1972) seven sub-domains. (Details of mean scores on the attitude sub-scales are available on request.)

Considering social class, there were no marked differences in home background (as measured by parental occupation) between active and non-participant students.

Previous participation in sports at school exerted its influence on the type of students' recreative activities in that the majority of active students were continuing some interest in physical activities from their school days. 50 per cent of male non-participants, and 30 per cent of women non-participants had not taken part in physical recreation at school. While a majority of students (123 active and 36 inactive) continued their previous school leisure patterns, 54 students ceased to take part in sports on coming to university, while 17 students became ‘ new participants.’ A wide variation of personality and attitude scores were evidenced by these groups and no consistent pattern emerged. Women ‘ drop-outs ’ had poorest average course-work grades ; and ‘ drop-outs ’ generally had more noticeable manual social-class associations.

(*b*) The mean scores in course work do not support the view that ‘ active ’ students as a group are academically inferior. Though the mean score of competitive men is, in fact, the lowest in Table 1, the difference from the mean of the non-participant men is small and non-significant. Among the women students, both categories of ‘ active ’ participants had significantly higher mean scores in course work than the non-participants, and these were the only significant differences to emerge from the comparison with academic attainment.

Accepting the limitation that the regression analysis on course-work attainment was calculated to highlight selected variables from the social and non-intellectual spheres (while previous school academic performance and its influences, for example, were ignored), the consistent association of introversion, stability and sports involvement for both men and women is noteworthy. Men and women, however, showed different attitudinal dispositions in relation to the dependent variable (see Table 2).

TABLE 2

BETA COEFFICIENTS FOR VARIOUS PSYCHOLOGICAL AND SOCIAL FACTORS IN A REGRESSION ANALYSIS AGAINST ACADEMIC ATTAINMENT.

Predictor Variables	Beta Coefficients	
	Men	Women
1. Introversion	0·37	0·26
2. Neuroticism	−0·15	−0·18
3. Social Class		0·15
4. School Sports Participation	−0·15	−0·18
5. University Sports Participation	0·12	0·18
Attitude to Physical Activity as :		
6. Social Experience	0·11	
7. Health and Fitness	−0·22	
8. Vertigo	0·18	
9. Aesthetic Experience		
10. Catharsis		
11. Ascetic Experience		0·18
12. Chance		

Cofficients below ·10 have been omitted.
Combined Multiple Correlation R=0·412.

The simple correlations between personality and academic success for men and women students combined were : introversion +0·25 ; neuroticism −0·10; and for sports participation were : extraversion +0·27 ; neuroticism −0·10.

DISCUSSION

Discussion of these findings is confined to (*a*) the social and psychological make-up of physically active students ; and (*b*) consideration of the various social and non-intellectual elements linked to course-work attainment.

(*a*) Whether or not students were involved in physical recreation at school appeared to have an effect on their university leisure patterns, though university life also exerted its influence. A majority of active students merely continued their interest in school-based sports, but a number of non-participants stated that they had given up physical pursuits at university in order to follow other social or leisure activities, that they lacked any real interest in physical recreation, or, in many cases, because of study pressures. University did, however, encourage a number of new participants in a range of individual activities like fencing, or horse-riding, not so readily available within the less widely optional school programme with possibly more limited facilities.

In contrast to Emmett's (1971) findings of a middle-class bias in the physical activities involvement of ' early leavers ' (i.e., 15 years of age), no marked social class differences were found between active and non-participant university students. This may be due to the selection which had preceded admission to university.

With regard to the degree of sports participation, competitive students from their responses, often seemed to be over-involved in physical activities. Not only did they represent university at one, or in some cases, even two sporting activities involving training and travelling hours, but additionally, they played other games and sports recreatively. Yet, overall, such intense involvement appeared to have little adverse influence on course attainment (see Table 1). A later analysis, not reported here, has shown that the highly extraverted competitives tended to do better at practical laboratory work than other students, and yet were not, as a group, significantly poorer in multiple choice tests or essays than recreative or non-participant students.

(*b*) No evidence was apparent, therefore, to suggest that involvement in university sport, even at a competitive level, was particularly damaging to course-work attainment. In fact, there was a tendency for active women students to be more successful in course-work than non-participants.

Again, taking a different approach, the regression analysis showed an association between academic success and sports involvement at university but not with previous school sports participation (see Table 2). It is possible to suggest that these differences revealed an achievement-orientation (cf.McClelland, 1961) where school sport may have been sacrificed for examination success, but that physical activities were then used to counter-balance academic work in university. In addition, these findings served to highlight the point that sporting students are not academically weak. Indeed, poor attainment may be one reason for giving up active sports involvement at university.

Further, in examining personality in more detail, it should be noted that stability and introversion figured prominently in the regression analysis of course-work attainment. On the other hand, active students were found to be more stable and extraverted than non-participants (see Table 1). Such contrary trends on the introversion/extraversion continuum raise questions about the possible advantages of particular personality characteristics in both university and sporting achievement. Eysenck (1972) has postulated that high anxiety drive in introverts could lead to even more strenuous study. Yet research by Entwistle and his associates (1971a, 1971b) has indicated that good study habits are related to introversion and stability (1971a), and academic motivation to stability (1971b). Such findings have led Entwistle (1972) to postulate that it may be the combination of high motivation with emotional stability which characterises the university student with high achievement drive : introversion and stability were found to be related to attainment in the present study.

So is there a *real* paradox between sporting and academic attainment (as measured in the present study) in terms of personality ? An examination of Table 1 shows that overall, recreatively active women students were rather more successful academically, but were less extraverted, than competitive students. This might suggest that there could be optimal levels (*within a tolerance range*) in personality dimensions for both sporting and course-work attainment, and this is reflected to some extent in the findings from the regression analysis, and in the simple correlations between personality and attainment.

Lastly, the typologies were presented principally to emphasise the need in future studies of university attainment to take a more comprehensive view of the students' life-style. Nevertheless, the fact that ' drop outs,' for example, were more likely to come from lower social classes, and that women ' drop outs ' had the poorest course-work grades, might be seen as supportive evidence for Sutton-Smith's (1963) contentions about games and a general life-style, and their withdrawal from leisure may be indicative of a deeper malaise associated with their academic work. This, however, is a tentative suggestion which must await further research.

In conclusion, the link between attainment and non-intellectual factors of personality and attitude, is clearly not a direct one, though a number of previous studies have tended to use such a simplistic approach. The present investigators—while admitting that the measure of attainment was limited to performance in psychology, and that generalisations to other courses such as engineering, medicine or law must be limited—have, nevertheless, attempted to highlight the possible value of using a wider range of achievement, including sport as well as academic attainment, and of considering a more extensive range of other intervening variables which may help to clarify their inter-relationship.

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RESEARCH NOTES

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PRE-SCHOOL MENTALLY HANDICAPPED CHILDREN

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SUMMARY. Information was collected on 150 mentally handicapped children who were under 5. Many of the children had additional handicaps and all showed marked retardation in their physical, social, play and language development. The majority of parents expressed a willingness to take part in a parental involvement project. Their main concerns were with the child's speech and language development and in coping with management problems. The implications of these findings for services provided for these parents and children is discussed.

INTRODUCTION

Although there have been many surveys involving the mentally handicapped and their families, these have tended to concentrate on school-age children or adults, and have been primarily concerned with the family and home situation (e.g., Tizard and Grad, 1961 ; Kushlick and Cox, 1970). Consequently there is very little information on the characteristics of the 'pre-school' mentally handicapped child, under 5 years old. Yet this information is very necessary for the planning of services to help these children and their parents. Already some authorities are taking children into ESNS schools prior to their fifth birthday and there is also an increasing interest in involving parents in helping their child's development during the early, formative years of life (Mittler, 1974). As the development of parental involvement schemes is of particular concern to us, we decided to carry out a survey which concentrated on the characteristics of the pre-school child, with the secondary aim of establishing the parent's willingness to take part in an involvement project.

METHOD

The Education Departments of the 10 authorities in the Greater Manchester Council were asked to supply the names of all children within their area who were officially classified as ESNS and who would be under 5 on October 1st, 1974. We were given 178 names which produces an incidence rate of 0·77 per 1,000. This is lower than the figure of 0·91 reported for Salford in 1961, but higher than that for Wessex (0·53—Kushlick and Cox, 1970).

On the advice of the authority, six of the parents were not followed up because of unusual circumstances affecting the child. A further two parents were excluded as they subsequently moved out of the GMC area. An introductory letter describing the project was then sent to 170 parents. Fourteen parents did not reply to this letter (even though a pre-paid card was enclosed) and one parent indicated she did not want to take part in the project. A further five parents expressed an initial interest in the project but they did not reply to further correspondence. The remaining 150 parents either were visited by a member of the project team (141) or completed the questionnaire by post (9) (87 per cent response).

RESULTS

Children's Characteristics.

The ages of the children ranged from 19 to 60 months, 50 per cent were 4 years old ; 34 per cent were 3 years old and 16 per cent were 2 years or less. If one assumes that the number of children born in any one year is relatively constant, then these figures suggest that children are not officially classified as ESNS until their third birthday or later. (This makes it difficult to calculate accurate rates in the age range

0—4 and to assess demand for services). As usual, boys outnumbered the girls ; 63 per cent and 37 per cent, respectively.

Aetiology : This was unknown in 28 per cent of the cases. The principal aetiologies reported are given in Table 1 along with their frequency of occurrence.

TABLE 1

FREQUENCY OF OCCURRENCE OF AETIOLOGIES.

	Percentage		Percentage
Down's Syndrome	41	Hydrocephaly	3
Cerebral Palsy	7	Microcephaly	2
Unspecified Brain Damage ..	5	Genetic Disorder (other than Down's)	2
Birth Injury	3	Other aetiologies reported	9

Additional Handicaps : 13 per cent of the children were presently experiencing epileptic fits (9 per cent were having grand-mal fits), but in all 20 per cent of the children were on medications to control epileptic fits. 27 per cent of the children had some form of physical handicap. In 11 per cent of the children this was a deformity or malfunctioning of the legs and in a further 10 per cent both the arms and legs were affected.

33 per cent of the children were reported as having difficulty in seeing. This ranged from short-sightedness to total blindness (although precise indications of loss of vision were rarely known). 9 per cent of the children had a squint. With the vast majority of children hearing tests of some description had been carried out and 9 per cent were reported as having difficulty in hearing, but the extent of hearing loss was often unknown.

Stages of development : In order to provide a framework for describing the child's abilities (and disabilities) we prepared development charts covering five main areas of development ; the development of physical skills, eye-hand skills, social skills, language and play. The items included in the charts covered the skills which children normally acquire during their first five years of life, although they concentrated mainly on the first two years.

Certain ' target ' skills were emphasised in the charts (e.g., ' walks confidently ' ; 'feeds self with a spoon') but the skills which precede these in development were also listed. Hence, we could ascertain from the parents whether the children had attained the target skills or, if not, the level of development they had reached. (Copies of the charts are available from the authors.) In order to summarise the results, only some of the skills within each area of development will be reported. The majority of the skills listed are normally attained by children at 24 months or, in a few cases, marked with an asterisk in the table, at 36 months.

In Table 2 the skills are given in developmental order with the most advanced skill first and the earliest skills last. In order to emphasise the children's retarded development, we have shown the percentage of children *not* capable of each skill. (The percentage of children who *have* attained the skills can, of course, be calculated by subtracting from 100.) The results are presented separately for the 4-year-olds and those who were aged 3 or under, so as to reflect the on-going development of the children. (There were 75 children in each grouping).

School Placement : 65 per cent of the 4-year-olds and 48 per cent of the younger children were attending an ESNS school, while a further 17 per cent and 16 per cent, respectively, went to a day-care nursery, a nursery school on a part-time basis or a local playgroup. 18 per cent of the 4-year-olds and 36 per cent of the younger children were at home all day.

TABLE 2

PERCENTAGE OF CHILDREN NOT CAPABLE OF EACH SKILL.

SKILLS	PERCENTAGE CHILDREN NOT CAPABLE	
	3 years and under	4 years
1. PHYSICAL SKILLS		
(*a*) *Mobility*		
Goes up and down stairs in an upright position	80	60
Gets up and down stairs but not upright	61	40
Walks confidently	51	28
Can get up off the floor unaided and stand	39	15
Walks with help from an adult	29	11
Can get around room by crawling or some other means	24	7
Sits alone on the floor	23	5
Holds head steady when sitting on your knee	9	3
(*b*) *Eye-Hand Skills*		
*Draws a ' man ' on request showing legs and head	99	96
Can scribble in circles and straight lines	60	43
Will use a pencil to scribble a little	42	24
Picks up small objects (e.g., small pieces of string between fingers and tip of thumb)	39	20
Reaches out and picks up small objects straightaway	22	7
Watches or follows a dangling toy moved in front of face	5	3
2. SOCIAL SKILLS		
(*a*) *Feeding*		
Feeds self with spoon, only occasional spilling	64	41
Manages a cup well	45	27
Feeds self with fingers	37	16
Takes solids well	13	8
(*b*) *Toileting*		
*Toilet-trained with infrequent accidents	92	68
Bowel control complete	69	54
Will use potty (or toilet) when put on it	44	37
Shows some regularity of bladder and bowel motions	45	31
(*c*) *Dressing*		
*Removes and puts on simple articles of clothing, e.g., vests and pants	71	64
Helps actively to dress and undress (e.g., pulls pants down)	52	32
Can take shoes and socks off	35	24
Co-operates in dressing—holds out arm or foot	23	17
3. PLAY		
Engages in make-believe play, e.g., putting doll to bed	70	53
Will join in play with one other person ; chasing or kicking a ball	42	35
Will hug or kiss a doll or teddy bear	43	39
Co-operates in games of clap hands and pat-a-cake	27	23
Enjoys peek-a-boo	12	12
4. LANGUAGE SKILLS		
(*a*) *Spoken Language*		
Put two words together, e.g., milk gone, bye-bye shoe	85	60
Uses 20 clear words	77	55
Talk is mostly jargon with some words clear	50	41
Uses 4 to 5 clear words	32	36
Babbles constantly with one clear word	27	27
Has two or more sounds which he repeats	12	9
(*b*) *Imitation of Language*		
Imitates one word	60	48
Imitates playful sounds—smacking lips	40	32
Imitates own sounds, ba-ba, ma-ma	32	23
Makes noises when talked to	20	22

TABLE 2—continued.

SKILLS	PERCENTAGE CHILDREN NOT CAPABLE	
	3 years and under	4 years
4. LANGUAGE SKILLS—continued.		
(*c*) *Understanding of Language*		
Identifies at least seven pictures of common objects....	72	53
Points to familiar person or toys on request................	51	41
Will obey simple request, e.g., give ball to mummy...	49	29
Comprehends simple commands if you use gestures, e.g., wave bye-bye	23	17
Responds to own name	8	11

The Family.

97 per cent of the children were living with their parents, 1 per cent were with a relative and 2 per cent were with foster parents. 9 per cent of the children were the only child in the family ; 22 per cent were the first-born in the family and 52 per cent the last born. 17 per cent had one sibling still living at home, 31 per cent had two siblings ; 11 per cent had three siblings and 16 per cent had four or more siblings at home. An estimate was made of the mother's age : 6 per cent were rated under 25 ; 43 per cent as between 25 and 35 ; and 51 per cent as over 35 years.

Parents' concerns : The parents were asked if they had had any particular problem with their child or if there was anything that concerned them now on which they would like guidance or help. 18 per cent of parents said that they had no problems or concerns. Of the remaining parents, 39 per cent mentioned one area of concern ; 27 per cent two areas of concern and 16 per cent three or more areas of concern.

A wide diversity of problems and concerns were expressed by the parents but for convenience we have grouped them into four areas and given examples of specific concerns mentioned. This is given separately for the two age groups of children as the type of problem varied with the age of the child. Parents with a younger child were more concerned about physical skills than parents of 4-year-olds, who were much more concerned with management problems. However, speech (and/or language) was the biggest single concern of all parents (see Table 3).

TABLE 3

THE PERCENTAGE OF PARENTS REPORTING EACH AREA OF CONCERN.

Area of Concern	Specific Examples	Percentage of Parents	
		3 years and under	4 years
Physical Skills	Walking Sitting	24	15
Social Skills	Toilet training Feeding self	27	25
Communication	Speech Language	41	41
Management Problem	Screaming Temper Tantrums Defiance Aggression to others	25	48

The Involvement Project : 42 per cent of the parents were willing to come regularly to the University to take part in the project while a further 18 per cent wanted to keep in touch through booklets and similar means. 40 per cent of the parents did not contact us again.

DISCUSSION

The main aim of the survey was to obtain information about the characteristics of pre-school mentally handicapped children with the secondary aim of establishing parents' willingness to take part in an involvement project. Although we realise that the latter finding could have limited generalisation, especially as the parent's willingness may well vary according to the nature of the project proposed, it was encouraging to find that the majority of parents were willing to be involved in a project based at the university which could involve them in a great deal of travelling. Undoubtedly, this willingness is a reflection of the parent's concern about their child's development. Interestingly, their major concerns were not with 'practical' issues such as toileting and feeding, where perhaps parents felt they could cope, but rather it was with speech and language or dealing with management problems. These are topics on which parents seldom receive guidance.

In many ways the children in this sample were *multiply* handicapped rather than *mentally* handicapped. They were retarded in all aspects of development ; physical skills, social skills, language and play. Only a minority of children had attained the skills which a normal child usually develops by age two years. Furthermore, many of the children had additional handicaps such as epilepsy or visual and hearing defects.

The majority of these children require specialist help and attention if their development is to be advanced. Yet there can never be sufficient professional resources available to give the sustained, one-to-one contact over prolonged periods of time that is necessary to further the development of handicapped children. It would seem logical, therefore, to give the parents more expertise, making them more effective in furthering their child's development. They are already the primary influence on their child's development especially during the early formative years and provide the necessary contact with the child that no professional could emulate. This would lead to a more active co-operation between parents and professionals.

The survey findings also have implications for the education which is provided for these children. Already the majority of children in this survey were attending an ESNS school and the proportion will undoubtedly increase. As many local authorities and teachers have recognised, the content and method of 'nursery education' provided in ESNS schools has to be different from that provided for normal children. Its curriculum has to cover such basic skills as walking, self-feeding and toilet training. It would also be insufficient simply to provide the children with the opportunity to play, or with an enriched language environment, when the children lack the necessary skills to make use of the opportunity. Often these children need to be taught to play or given specific help in acquiring language skills, albeit within the context of an enriched environment. Perhaps the most urgent need at present is the development of teaching schemes which teachers and parents can use to further the child's development (see Jeffree and McConkey, 1974). By itself, obtaining information about the needs of parents and children is a small step : meeting these needs is the major challenge.

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CULTURAL DIFFERENCES IN CHILDREN'S CONCEPTS OF READING AND WRITING

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SUMMARY. Previous research has indicated that children enter the task of learning to read in a state of cognitive confusion regarding the function and nature of the task. The present investigation was addressed to the hypothesis that cultural differences in home background are an important influence in the development of children's understanding of the purpose of writing and their concepts of the language units employed in the written code. 92 non-Indian Canadian children at kindergarten were compared with 72 kindergarten pupils from two Indian bands in which there is no tradition of literacy and a poverty of experiences of writing and formal concern with language analysis. On all five measures used the Indian children scored significantly lower. They were less able to recognise literacy activities, less cognisant of their purpose, and had poorer technical knowledge of units of speech and writing.

INTRODUCTION

Fitts and Posner (1967) concluded from their review of research on human skills that their development usually involves three phases : (1) the cognitive phase, in which the learner comes to understand the nature of the task and develop concepts of its component parts ; (2) the association of specific responses with the appropriate stimuli ; and (3) making the performance of the skill automatic. In the teaching of reading the second phase seems to receive most attention from teachers, while the first and third phases seem comparatively neglected. Neglect of the first phase may cause the learner to enter the second phase unready to handle the concepts and technical terms needed to talk and think about the written and spoken forms of language and the relations between them—what DeStefano (1972) calls the " Language Instruction Register."

The significance of this initial cognitive phase of learning to read is indicated also by M. D. Vernon's (1957) review of research on the causes of reading disability. She concluded : " Thus, the fundamental and basic characteristic of reading disability appears to be cognitive confusion." She found that the child who has failed in reading is " hopelessly uncertain and confused as to why certain successions of printed letters should correspond to certain phonetic sounds in words." Vernon commented that " this confusion resembles that of a young child who is just beginning to read." The normal cognitive confusion of the beginner is not surprising when one considers the peculiar difficulty which learning the skill of reading poses for the child. Unlike many other skills, it is impossible to imitate successfully the essential actions of a skilled reader. The young child cannot see for himself what the reader is doing or why he does it. The association between the development of specific concepts of language and attainments in reading was shown by Francis' (1973) recent finding of a high correlation between reading achievement and knowledge of the technical terms of language analysis, " indicating that factors independent of a general ability to deal with abstract concepts were involved in learning technical vocabulary and that these were closely related to the reading process."

Another aspect of the initial cognitive phase of learning the skill of reading is the concept of its function. Vygotsky (1962) discovered that this knowledge cannot be taken for granted in beginners. He reported that the child " has little motivation to learn writing when we begin to teach it. He feels no need for it and has only a vague idea of its usefulness." Although Vygotsky saw this as a motivational problem, nonetheless it is initially a cognitive one.

A number of recent investigations have provided more specific evidence of the child's initial state of cognitive confusion about concepts of speech and writing and the function of the latter. Karpova (1955), Huttenlocher (1964), Reid (1966), Chappell (1968), Downing (1970), and Holden and MacGinitie (1972) have all provided evidence that the young school beginner's perception of segments of speech does not coincide with the teacher's concepts of word or phoneme. Similar confusion in young children's concepts of units of writing or print has been reported by Reid (1966), Meltzer and Herse (1969), Downing (1970), Turnbull (1970), Clay (1972), and Kingston *et al.* (1972). The initial lack of understanding of the purpose of writing and books was reported by Reid (1966) and Downing (1970).

Several studies have been concerned with the growth of these concepts of speech and writing. Both Reid (1966) and Downing (1970) made longitudinal observations through their subjects' first year in school. Changes in the children's categorisation of auditory stimuli in the latter author's investigation indicated learning by trial and error groping for the concepts of word and phoneme. Lansdown and Davis (1972) compared normal primary school pupils with ESN children and found that cognitive confusion over such concepts persisted to a later age in the ESN pupils. A relationship between age and sophistication of the concept of spoken word was found in a comparison of three age groups by Downing and Oliver (1974). Similar growth in understanding of the concepts of letter and printed word has been found by Turnbull (1971) and Clay (1972).

The influence of experience on the development of concepts of speech and writing has been shown in two previous studies. Ollila *et al.* (1974), using a procedure for training the perception of phonemes developed by Elkonin (1973), found that the child's concept of phoneme is affected by special training. The other study utilised natural differences in home background experiences: Downing *et al.* (1975) found that the development of children's concepts of the function of writing and their concepts of units of printed language was related to socio-economic class. The way in which social class backgrounds may influence the cognitive aspects of reading readiness has been described by Downing and Thackray (1971). For example, there are likely to be fewer discussions of writing, print, spelling, books and other aspects of literacy behaviour in the lower socio-economic class home than in the higher socio-economic class home.

The aim of the new research to be reported in the ensuing sections of this article was to obtain further evidence of the effects of different home backgrounds on children's development of concepts of language and writing. In this case, the differences studied were between two cultures, Indian and non-Indian peoples both living in the same districts on the Pacific coast of Northern British Columbia.

METHOD

Sample.

All the children studied were attending kindergartens in two widely separated districts of British Columbia. The Indian populations in the two districts come from two distinct bands, but both bands provide backgrounds which differ from the non-Indian children in the same localities in a number of respects. Of particular concern to this study is the fact that the Indian children come from a culture with no tradition of written language, but their homes are also generally poorer economically and reading materials are rare. Their parents are less conscious of the act of speaking and they have little or no recourse to writing. Their Indian languages are no longer used, except by a few of the oldest men and women in the bands. The children and their parents speak a form of English.

The non-Indian children, in contrast, live in homes where writing or print is more common. Their culture is traditionally literate and their parents read and write and some talk about these activities. The children are more aware of such things as 'correct' speech and spelling and these are sometimes a topic of conversation.

In district I all the Indian boys and girls in kindergarten were tested. They were compared with a sample of non-Indian boys and girls selected by random procedures. In district II the same sampling method was used. Details of the numbers of children tested in each category are given in Table 1.

TABLE 1

Mean Reading Readiness Subtest Scores for Indian and Non-Indian Children of Both Sexes in Two Districts.

	DISTRICT I				DISTRICT II			
	Indians		Non-Indians		Indians		Non-Indians	
	Boys (N=30)	Girls (N=29)	Boys (N=38)	Girls (N=28)	Boys (N=6)	Girls (N=7)	Boys (N=17)	Girls (N=9)
Orientation to Literacy	1·53	1·31	1·74	1·79	1·17	0·71	1·76	1·67
Understanding Literacy Behaviour	1·43	1·62	2·45	2·61	1·17	1·14	2·00	2·77
Technical Language of Literacy	1·53	3·31	6·37	7·54	1·00	3·14	5·65	4·89
Visual Letter Recognition and Letter-name Knowledge	5·20	8·41	11·53	11·96	4·33	7·85	9·82	11·22
Initial Phonemes	5·47	6·27	8·58	8·96	6·00	3·71	6·52	7·89

Instruments.

Five subtests of the Canadian Reading Readiness battery were administered. This test battery is still in the experimental stage of development. A brief summary of the five subtests is given below. For further details, see Evanechko *et al.* (1973) :

(1) *Orientation to literacy.* Six items are used to determine the child's understanding of the communication purpose of literacy. On each item the child must select pictures which illustrate the purpose and reject those which are irrelevant.

(2) *Understanding literacy behaviour.* This subtest has six items designed to find if the child can recognise reading and writing activities. The child must select pictures illustrating 'reading' or 'writing' and reject others which are non-exemplars of these concepts.

(3) *Technical language of literacy.* This consists of 12 items designed to measure the child's knowledge of technical linguistic concepts such as 'letter,' 'word,' 'number' etc., For example, the child must find each object which is a 'word' in a row of various printed items.

(4) *Visual letter recognition and letter-name knowledge.* Twenty-one items measure the child's ability to discriminate and recognise visually upper and lower case letters in relation to their letter-names.

(5) *Initial phonemes.* This subtest comprises 19 items in which the child selects a picture the name of which has the same initial phoneme as another picture specified by the tester.

These subtests are all paper and pencil group tests. In this research the maximum size of the group for a testing session was fixed at 15.

RESULTS

The mean scores on each subtest for Indian and non-Indian boys and girls for each of the two districts are shown in Table 1. To test the hypothesis that the non-Indian pupils would obtain higher scores on reading readiness than Indian children, the data were treated in a 2 (culture) × 2 (sex) × 2 (area) multivariate analysis of variance for the five dependent measures (see Table 2). These results show that the scores of the Indian children were significantly inferior to those of the non-Indian children on every measure ($P < \cdot 001$ for four of the five measures). Only the ' cultural ' main effect was significant. There were no significant differences between the two districts or between boys and girls, and no significant interactions either.

TABLE 2

MULTIVARIATE AND UNIVARIATE TESTS OF THE EFFECTS OF CULTURE ON READING READINESS SUBTEST SCORES.

	Univariate F-tests			
Variable	MS	df	F	P<
Orientation to Literacy	8·17	1,156	6·20	·004
Understanding Literacy Behaviour	32·77	1,156	20·49	·001
Technical Language of Literacy	391·94	1,156	19·78	·001
Visual Letter Recognition and Letter-name Knowledge..................	575·88	1,156	19·93	·001
Initial Phonemes	181·11	1,156	10·24	·001

Multivariate F=6·58, df=5, 152, P< ·001.

DISCUSSION

The hypothesis was supported by the treatment of the results of the subtests. The children from the culture which provided less experience of literacy behaviour and less awareness of the act of speech showed greater cognitive confusion about reading and writing. They were significantly less able to recognise the acts of ' reading ' and ' writing.' Their concepts of the communicative function of reading and writing were significantly immature. Their understanding of the technical terms ' word ' and ' letter ' was significantly less adequate. Their ability to recognise and name letters was significantly poorer. Their perception of phonemes was significantly less well developed.

These findings seem to indicate more generally that children's cognitive clarity regarding the functions and task activities of the skills of literacy is influenced by socio-cultural factors. Possibly the specific causal relationship depends on the extent to which an environment provides experiences to stir the child's curiosity and give him sufficient reliable information for discovery of the appropriate linguistic concepts. Children's home backgrounds vary in such provisions. The ultimate outcome in school in the cognitive phase of skill development may be affected to an important degree by the resources and planning of teachers seeking to provide reliable information for concept development in early experiences of reading and writing activities. One possible difficulty in current educational circumstances may be the teacher's own understanding of the linguistic concepts involved in learning to read. Unfortunately, the training of teachers in linguistics may not be adequate and many teachers may not have carefully thought out what concepts children need to learn at the initial cognitive phase.

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LATERALITY AND READING ATTAINMENT

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SUMMARY. 60 children with reading ages 18 months or more below their chronological ages, were compared with a control group of the same size who had average or above average reading ages. Both groups completed a laterality questionnaire relating to different aspects of perception and handedness. Inconsistencies in the different aspects of laterality were found, making connections between laterality and attainment more complex than has previously been assumed. However, showing a complete set of unilateral characteristics was still the best predictor of reading attainment, while using either hand, being 'left eared' and mixtures of eye and hand usage were associated with retarded reading.

INTRODUCTION

Since Orton (1937) used the terms 'cerebral dominance' and 'dyslexia' in relation to reading failure, the issue has been the subject of controversy between the various schools of thought in this field (e.g., Naidoo, 1972 ; Zangwill, 1962 ; Critchley, 1970 ; Bannatyne, 1966 ; Clark, 1970 ; Rutter *et al.*, 1970). The implications of differing hemispheric functioning in the brain for various abilities have been increasingly investigated since Orton's day (Money, 1966 ; Newton, 1974 ; Satz and Sparrow, 1970) and have been subjected to sophisticated research techniques such as EEG (Newton, 1970), dichotic listening (Bryden, 1970 ; Bakker, 1974), 'split brain' techniques (Sperry, 1967) and clinical studies (Zangwill, 1962). The purpose of the study reported here is to examine one of the applied consequences of these approaches. Brain functions not developing unilaterally are often reflected in the laterality (handedness, eyedness, footedness, earedness) of the individual. This has led to 'left-handedness,' 'cross laterality' and related concepts being examined in relation to reading. An hypothesis for much of the conflicting evidence has been proposed by Annett and Turner (1974), but it is important to determine how far the different indices of laterality provide consistent categorisations and to what extent each of the indices relates to attainment in reading.

METHOD

In the process of validating a screening procedure for children at risk in the acquisition of written language, one of the items consisted of a questionnaire on laterality. The items were :

Handedness : hand used for writing, cutting with scissors, throwing a ball, dealing cards, unscrewing a lid.

Eye : eye used for looking through telescope and looking at stimulus through hole in paper, held at arm's length initially, then brought up to (one) eye.

Foot : foot used for kicking ball which is thrown towards testee.

Ear : ear used for listening to transistor radio turned low and placed on table (or wrist-watch on table).

Each child was asked to *perform* these items *twice* in a standard testing procedure.

Reading retardates and a matched control group were used, taken from four primary schools. The reading retardates had reading ages one-and-a-half or more years below their CA on the Schonell Graded Reading Test, while the control group had reading ages at or above their CA. Details are shown in Table 1. Each group consisted of 60 children, the control group being selected from the same class as the retardates, this latter group being selected in the first instance by the teacher.

TABLE 1

MEAN CHRONOLOGICAL AND READING AGES OF CONTROL GROUP AND RETARDATES.

Age		Retardates	Controls
Chronological	Mean (SD)	8·82 (0·94)	8·93 (0·72)
Reading	Mean (SD)	6·96 (0·83)	10·41 (0·98)

The categories examined were :

'*Left handedness.*'

write=hand used to write with only.

all=left hand used for all measures.

'*Mixed handedness.*'

2+ =two or more tasks being undertaken by other than the most commonly used hand.

1+ =only one other task being undertaken by other than the most commonly used hand.

' *Cross laterality.*'

hand all/eye=hand and eye being oppositely lateralised, e.g., right hand, left eye, where ' right hand ' is defined by *all* handedness tasks being undertaken by right hand, and ' left eye ' by *all* eyed tasks being undertaken by left eye.

hand mixed/eye=right hand to write with, but with one or more of the other handedness items being undertaken by left hand, and ' left eyed ' on any task for the eye, i.e., mixed hand, left or mixed eyed.

hand write/eye=right hand for writing only, and left eyed for all eyed tasks, which thus includes both previous groups.

' *Left eared* '

One or more trials for the ' eared ' task being left.

'*Left eyed.*'

all left eye=both tasks being undertaken by the left eye.

any left=at least one task being undertaken by left eye, i.e., including those with ' either ' eye, or left for one task, right for the other.

An attempt at a *quantitative score* was given by looking at inconsistencies in total performance. This was as follows : A maximum of 10 is given for all items being unilateral (usually all ' right '). Then 2 points off for any items oppositely lateralised (usually ' left ') ; 1 point being taken off for items ' either ' or ' right ' one trial and ' left ' the next. Thus, a low score is indicative of an ' ill-lateralised ' individual, a score of 0 indicating 5 items by ' left ' and 5 items by ' right.' This apparently complex system is, in fact, easy to score practically, and is an attempt to measure inconsistencies in total laterality as opposed to one feature.

RESULTS

The percentage of children falling into the various categories for ' retarded ' and ' average ' reading groups are shown in Table 2. Chi-square analysis was used to test the statistical significance of differences emerging, the direction of each relationship being clear from the raw data.

TABLE 2

PERCENTAGE OF CHILDREN WITH RETARDED AND AVERAGE (+) READING ABILITY IN VARIOUS LATERALITY CATEGORIES.

Category	Retarded	Average +	χ^2, P<
	(N=60)	(N=60)	
1. 'Left handedness'			
write	13	11	NS
all	2	0	
2. 'Mixed handedness'			
2+	46	15	·01
1+	31	27	NS (·10)
3. 'Cross laterality'			
hand all/eye	19	15	NS
hand mixed/eye	22	15	·02
hand write/eye	42	31	·05
4. 'Left eared'	44	23	·001
5. 'Left eyed'			
all left eye	28	24	NS
any with left eye	47	24	·01
6. Quantitive score	4·9	8·1	·01*
number with all unilateral (score 10)	6	42	·001

* Mann-Whitney test.

TABLE 3

CONDITIONAL PROBABILITIES OF BEING RETARDED OR AVERAGE (+) IN READING ATTAINMENT FOR EACH LATERALITY CATEGORY.

Categories		Conditional Probability	
		Retarded N=60	Average+ N=60
Mixed-handed	(Two)	·77	·23
	(One)	·54	·46
Not mixed-handed	(Two)	·18	·49
	(One)	·50	·49
Cross-lateral	hand all/eye	·56	·44
	hand mix/eye	·74	·25
Not cross-lateral	hand all/eye	·48	·51
	hand mix/eye	·45	·55
Left-eared		·77	·23
Not left-eared		·37	·62
Left-eyed	all left	·54	·46
	any	·66	·32
Not left-eyed	all left	·49	·51
	any	·41	·58
All unilateral		·13	·87
Not unilateral		·62	·38

Another way of examining the data is in terms of conditional probabilities. The relative probabilities of laterality occurring in one of the groups is given by the following formula: $P(B/A)=\frac{P(A \cap B)}{P(A)}$, where B is one of the laterality categories, such as ' mixed handedness ' and A is the group concerned (i.e., retarded or average). Thus, Table 3 presents the conditional probability of a child being retarded or average in reading attainment for each of the laterality categories.

DISCUSSION

It may be seen immediately that relationships between laterality and reading vary considerably depending upon the index used and upon amount of information in each category. This lack of consistency probably explains many of the conflicting reports on the various indices of laterality which have previously been published. Too little information has been provided about the laterality questionnaires used in many of the previous studies. The findings here emphasise the importance of providing full details ; only then may more consistency emerge.

The common feature in the present results appears to be not only *inconsistencies* of laterality, but also inconsistencies in constellation of hand/eye/ear/foot. It is the individual nature of each person's pattern of inconsistency that seems the significant feature in many cases of reading, as well as spelling and writing, difficulties. Relatively stable hand or eye preference, however, as manifested by all the tasks on the questionnaire, appears to be more independent of reading ability.

Furthermore, the whole question of laterality and attainment is much more complex than has been previously supposed, both by Orton and his followers, as well as his critics. For example, not all reading retardates show inconsistent laterality, and 58 per cent of this sample from the control group did at least one task with their non-preferred side. The issue appears to be one of probabilities. For example, in studying the conditional probabilities it is apparent that if a child is mixed handed as defined by our category (2+) he has a substantial chance (P=·77) of being retarded in reading, whereas the child *not* falling into this category has an almost 50/50 chance of being good at reading, and this categorisation is not such a reliable indicator. Being mixed-handed, cross-lateral (hand mixed/eye) or left-eared give the best ' predictions ' of poor reading, while being completely unilateral is the best predictor of good reading. Other differences in the probabilities are clear from Table 2 and need no further comment.

In considering the results presented in this paper, it is important to recognise that such surveys of laterality should be related to some theoretical framework. Here the theory involves hemispheric brain function (e.g., Newton, 1974). Laterality of motor and sensory mechanisms is one expression of this kind of underlying neurological organisation, and can be an indirect measure of this. Inconsistent laterality is hypothesised as reflecting a neurological organisation which predisposes the individual to perform less well on ordered directional and sequential tasks. Poor performance in reading would be an example of such failure (Newton and Thomson, 1974). Of course, neurological organisation also interacts with a host of environmental factors which complicate the issue and necessitate a probability model in explanation of the observations.

Finally, another cause of the conflicting reports in relation to laterality and reading difficulty should be noted. The results will depend on the population considered. Children in clinics who have specific difficulties in reading will show different characteristics when compared with a group of reading failures in a normal school population. Children in school are likely to show many different reasons for their difficulties. Clinic children are more likely to show clear-cut laterality patterns in relation to reading difficulties. Findings from these two different populations cannot be expected to be directly comparable.

It is hoped that future research on this issue will be more sophisticated in its generation of the data, both on the actual testing procedure as well as categories included, and that pronouncements on the subject will be less dogmatic.

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CREATIVITY AND ACHIEVEMENT IN NUFFIELD PHYSICS

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SUMMARY. Tests of creativity, intelligence and attitude towards science were administered to a group of 110 pupils who were also candidates for the Nuffield ordinary level physics examination. No support was found for the hypothesis that creativity would be related to performance in Nuffield Physics of which the most important correlate was general intelligence. Verbal and figural creativity emerged as separate factors and verbal creativity was found to be weakly related to verbal intelligence.

INTRODUCTION

Studies by Hudson (1966), Mackay and Cameron (1968), and Cropley and Field (1968), have shown that science specialists tend to obtain low scores on tests of creativity in comparison with arts specialists. The scientists excel on tests of convergent thinking ability—traditional intelligence tests. Hudson suggested that scientific education in schools had perhaps become dislocated from the world of research where intuition and imagination do play an important role.

In the late 1950s there was an increasing awareness among science teachers in schools in the United Kingdom of the need for a renewal of the science curriculum. In 1962 the Nuffield Foundation funded a science teaching project with the initial task of developing new courses in physics, chemistry and biology for pupils of above average ability in secondary schools. These courses would lead to the ordinary level examination of the General Certificate of Education.

One of the aims of the Nuffield Science Teaching Project was " to encourage children to think freely and courageously about science " (Nuffield Foundation, 1964). Kerr (1966) states that " the central purpose of these new and exciting courses is to stimulate critical and imaginative thinking." The teachers' guide to the Nuffield ordinary level physics course stresses the importance of "encouraging pupils to do more creative thinking " (Nuffield Physics, 1966). Suchman (1967) links creative thinking directly with the discovery method. His description of how creative thinking can be promoted is " to make the teacher's role less directive and more responsive, to have the learner focus on the problem, and allow him to gather data freely with the help but not the direction of the teacher." This matches very closely the teaching model suggested in the Nuffield physics course.

Recognition of the close relationship between the type of examination set and style of teaching led to the provision of separate GCE examinations for pupils following Nuffield courses. Boulind (1968) states that the Nuffield ordinary level physics papers are designed to test " teaching for understanding " and " experience of being a scientist " rather than " cheap recall." Particular emphasis is placed on relating the examination to the real aims of the course. The examination, therefore, includes questions which are relatively unstructured and which provide opportunities for a candidate to go beyond the conventional answer. Examiners have freedom to reward unusual answers. A candidate who gives an ' expected ' satisfactory answer may obtain full marks. " But there may be a rather better answer, possibly something the examiner never thought of." In that case bonus marks may be given for that part of the question.

If a course is designed to encourage creative thinking and the corresponding examination provides a valid test of the extent to which the course objectives have been achieved, one could reasonably expect measures of divergent thinking ability and achievement in the examination to be positively correlated. The primary purpose of the present investigation was to test this hypothesis for a sample of pupils who were following the Nuffield ordinary level physics course. It was, however, recognised that other variables such as general intelligence, interest in, and attitude towards science, might also be relevant, and measures of these were, therefore, included in the test battery.

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METHOD

Sample.

The sample consisted of 110 pupils, 73 boys and 37 girls who were candidates for the special Nuffield ordinary level physics paper. The mean age of the group at the time of testing was 16 years 10 months. The pupils came from two schools in Bristol and three in London. Two of the schools, one in each area, were large co-educational comprehensives and three were single-sex grammar schools.

In three out of the five schools only the top stream took Nuffield Physics ; in one school almost all pupils took Nuffield Physics ; and in another, the number of pupils choosing physics was relatively small, but all who did take it followed the Nuffield course. The sample, therefore, was inevitably weighted with pupils of above-average ability.

Measures.

Each pupil completed five test instruments :

(i) the AH4 group test of intelligence (Heim, 1970) ;
(ii) the Torrance tests of creative thinking-verbal *A* (Torrance, 1966a) ;
(iii) the Torrance tests of creative thinking-figural *A* (Torrance, 1966b) ;
(v) the Science Opinion Poll (Laughton and Wilkinson, 1968) ;
(iv) a short questionnaire concerning choice of school subjects and career aspirations as well as basic biographical information.

In addition, the grades obtained in O-level physics were supplied by the principals of the schools.

The AH4 test yields separate verbal and non-verbal scores and may be considered as providing a measure of convergent thinking ability since the main emphasis is on deductive reasoning.

The Torrance tests of creativity are intended to provide measures of divergent thinking ability. The verbal test has seven activities : *asking*, *guessing causes*, *guessing consequences*, *product improvement*, *unusual uses*, *unusual questions* and *just suppose*. Three scores are derived from the verbal test : *fluency*, a measure of the number of ideas with words, *flexibility*, a measure of the variety of ideas, and *originality*, a measure of the number of unusual ideas.

The figural test contains three activities : *picture construction*, *picture completion*, and *lines*. In all of these the subject is asked to elaborate as much as possible on an existing figure and to add a title. In addition to scores for *fluency*, *flexibility* and *originality*, a fourth score described as *elaboration* is derived from the figural test. Elaboration is defined as imagination or exposition of detail.

The Science Opinion Poll is effectively a Likert-type attitude scale. It contains 50 statements about science with which the subject is asked to express his agreement or disagreement on a five-point scale. Examples of the statements are :

Science is a particularly useful subject.

There is too much mathematics in Science.

A single numerical score which is a measure of the pupil's attitude to science is derived from his responses to the separate statements.

In the questionnaire, pupils were asked to state the ordinary level subjects they were studying and the advanced level subjects they hoped to study. They were also asked to indicate their career preferences by choosing a career they would like, and one they would dislike, from a selection which included six science-biased and six arts-biased careers. Three numerical scores were derived from the questionnaire representing, respectively, the extent of science bias in the pattern of O-level subjects, interest in studying scientific subjects at A-level and preference for a scientific career. It became clear in discussions in the sample schools that the pattern of O-level subjects was as much a reflection of the school curriculum and timetable as of the interests of the pupils. Consequently this variable was omitted from the analysis.

Analysis.

Fourteen variables were included in the main analysis. (See Table 1.)

Product-moment correlation coefficients were calculated between each pair of variables. A principal components analysis was carried out on the correlation matrix inserting unities in the diagonals. This resulted in four factors with eigen values greater than unity. These factors were then rotated by the Varimax method. This procedure was carried out on the Queen's University computer using programme BMD NO3M (Dixon, 1964).

RESULTS

The intercorrelations of fourteen variables are given in Table 1. The various measures of creativity have uniformly low and non-significant correlations with Nuffield O-level physics grades. The only variables which correlate significantly with performance in physics are verbal intelligence ($r=0{\cdot}35$, $P<0{\cdot}01$), non-verbal intelligence ($r=0{\cdot}40$, $P<0{\cdot}01$), A-level subject choice ($r=0{\cdot}27$, $P<0{\cdot}01$) and attitude to science ($r=0{\cdot}23$, $P<0{\cdot}05$). There are also significant correlations between attitude to science and A-level subject choice ($r=0{\cdot}60$, $P<0{\cdot}01$), and between attitude to science and career preference ($r=0{\cdot}46$, $P<0{\cdot}01$).

TABLE 1

INTERCORRELATIONS OF FOURTEEN VARIABLES.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. A-level subject choice†		62	60	27	06	16	–08	–10	–01	–08	–02	–03	–16	–05
2. Career preference† ..			46	22	06	08	02	05	–02	10	09	11	–13	01
3. Attitude to science ..				23	18	18	11	13	04	02	03	07	–02	10
4. O-level physics grade					35	40	08	02	16	04	01	13	–04	–14
5. Verbal intelligence ..						55	31	27	32	15	17	09	–03	03
6. Non-verbal intelligence							07	07	09	11	13	10	01	16
7. Verbal fluency								85	80	24	28	18	24	15
8. Verbal flexibility ..									68	21	22	11	24	23
9. Verbal originality ..										11	15	10	13	–10
10. Figural fluency .. .											90	81	46	50
11. Figural flexibility ..												81	43	45
12. Figural originality ..													38	44
13. Figural elaboration														28
14. Sex (*F*>*M*)														

Decimal points omitted.
Correlations ≥ 0·24 are significant at the 1 per cent level.
Correlations ≥ 0·19 are significant at the 5 per cent level.
† A low score represents arts bias, a high score science bias.

The non-verbal measures of creativity are highly intercorrelated with a mean value of 0·84 if elaboration score is omitted, and 0·63 if elaboration score is included. The same is true for the measures of verbal creativity for which the mean intercorrelation is 0·78. These high correlations, commonly found with the Torrance tests, are to some extent a reflection of the method of scoring in which the same activities are scored for different dimensions. Correlations between verbal creativity and verbal intelligence are low but positive with a mean value of 0·30 ($P<0{\cdot}01$), while those between figural creativity and verbal intelligence are much lower and non-significant with a mean value of 0·10. Correlations between non-verbal intelligence and creativity are uniformly low and non-significant. Significant correlations between sex and measures of figural creativity, with a mean value of 0·42, reflect the superior performance of girls on the figural tests.

Table 2 shows the results of the factor analysis. On the first unrotated factor, which accounts for 27 per cent of the variance, there are moderate to high loadings on all the measures of creativity, a moderate loading on sex and a low, but significant, loading on verbal intelligence. This appears to be a *divergent thinking* factor with slight overlap with verbal intelligence. Factors II, III and IV are bipolar and consequently difficult to interpret.

TABLE 2

FACTOR LOADINGS BEFORE AND AFTER ROTATION.

	Principal Components				Varimax Rotation			
	Factor I	Factor II	Factor III	Factor IV	Factor I	Factor II	Factor III	Factor IV
1. A-level subject choice† ..	−01	69	46	33	−09	88	08	12
2. Career preference†	13	57	44	41	06	84	01	03
3. Attitude to science	19	63	33	32	03	79	10	14
4. O-level physics grade ..	18	57	13	−41	−05	27	02	68
5. Verbal intelligence	39	47	15	−56	05	00	28	79
6. Non-verbal intelligence	29	43	12	−66	10	05	−02	84
7. Verbal fluency	66	20	−62	22	18	01	94	07
8. Verbal flexibility	61	19	−60	26	16	03	90	02
9. Verbal originality	51	30	−66	12	00	−01	88	16
10. Figural fluency	81	−31	35	−03	93	01	08	09
11. Figural flexibility	82	−28	32	−02	91	03	12	10
12. Figural originality	74	−26	41	−04	88	07	01	11
13. Figural elaboration	53	−35	01	08	57	−15	21	−11
14. Sex ($F>M$)	53	−27	28	05	66	02	01	−03
Percentage variance	27·39	18·09	15·94	10·24	23·65	15·58	18·81	13·62
Cumulative total	27·39	45·48	61·42	71·66	23·65	39·23	58·04	71·66

Decimal points omitted.
Loadings $> \pm 0{\cdot}30$ are treated as significant.
† A low score represents arts bias, a high score science bias.

After rotation the factors are much more clearly defined. All the measures based on the picture tests load highly on Factor I which can be identified as *figural creativity.* The significant loading of sex on this factor indicates a tendency for girls to perform better on the figural tests.

The variables with high loadings on Factor II are A-level subject choice (high score equals science preference), career preference (high score equals science bias) and attitude to science (high score equals favourable attitude). This factor can probably best be described as *attitude to science* and offers some validation for the attitude scale. It is only weakly related to actual performance on the Nuffield O-level physics examination.

The verbal measures of divergent thinking load highly on Factor III which can be identified as *verbal creativity.* There appears to be a weak, but not negligible, association with verbal intelligence.

The intelligence measures, both verbal and non-verbal, load highly on Factor IV which is the only factor on which O-level physics grade has a significant loading. This factor is presumably *general intelligence.*

DISCUSSION

No evidence was found to support the original hypothesis of a relationship between creativity and performance on the Nuffield ordinary level physics examination. The only variables clearly related to examination grades are verbal and non-verbal intelligence. These are recognised as measures of convergent thinking ability. The pattern of results is similar to those of Edwards and Tyler (1964) and Cicirelli (1964). In both these studies low correlations were found between creativity and academic achievement and relatively high correlations between intelligence and achievement.

The close association between measured attitudes to science, career preference and choice of A-level subjects is not unexpected, but it is surprising that actual performance in O-level physics is so unreliable a guide to attitude to science or indeed to career preference or choice of A-level subjects. In this connection it should perhaps be noted that the tests were administered after the O-level examination had been taken but before the outcome was known.

The results also provide some evidence relevant to the more general questions of the independence of verbal and figural creativity, and of intelligence and divergent thinking ability. On the former question, verbal and figural creativity emerge in the present study as separate entities with low intercorrelations between the relevant subscores. With regard to the latter question the results are not quite so clear cut. Figural creativity appears to be independent of both verbal and non-verbal intelligence; verbal creativity, while independent of non-verbal intelligence, is weakly related to verbal intelligence. A number of studies (e.g., Anderson, 1960 ; Yamamoto, 1964) have suggested that intelligence and creativity are independent only above some critical level of intelligence. The present sample was of high IQ and would almost certainly lie above such a threshold.

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IMPULSIVITY : SELF-REPORT AND PERFORMANCE MEASURE

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SUMMARY. A sample of 98 boys, aged 11–12 years, completed the Junior Eysenck Personality Inventory and were individually administered Kagan's Matching Familiar Figures test of reflection/impulsivity. Four groups were formed on the basis of median splits on two indices of impulsivity and a two-way analysis of variance was carried out against Eysenck's personality dimensions and an additional impulsivity factor derived from the same inventory. The fact that no main effects or interactions were obtained for any self-report measure was discussed with reference to other failures to validate the JEPI.

INTRODUCTION

Kagan (1966) has posited the existence of a dimension which he has labelled 'conceptual tempo.' A matching-to-sample task, the Matching Familiar Figures test (MFF) is used to classify children along a continuum from impulsivity to reflection. The operational index of conceptual tempo was originally mean first response time on the MFF until Kagan *et al.* (1966) introduced the idea of combining response time and error scores so that children who make more than the sample median errors and whose response time is less than the sample median are classified as impulsive while those who fall in the other quadrant are labelled reflective.

While Kagan has tended to suggest that the operation of conceptual tempo is restricted to situations involving " problems that contain response uncertainty " (Kagan and Kogan, 1970) there is evidence that the dimension may possess greater generality. For example, two studies (Harrison and Nadelman, 1972 ; Constantini *et al.*, 1973) have reported that conceptual tempo is related to the ability to inhibit motor activity, while Meichenbaum and Goodman (1969) have produced evidence which suggests that there is a relationship between conceptual tempo "and the ability to control motor behaviour verbally " as measured in a Luria-type task.

As Farley (1970) has pointed out, several investigators have suggested that extraversion-introversion (E–I) may contain a component which can be labelled 'impulsivity-reflectiveness.' It is not surprising, therefore, that Kagan (1971) suggested that conceptual tempo and E-I may possess some common variance. Cairns (1973) tested this assumption using the response time score only from the MFF and the extraversion scale of the JMPI and found a negligible correlation between these two measures in two groups of boys aged 8–9 and 11–12 years.

Recently Berger (1973) has again noted the possibility of a link between conceptual tempo and the "behaviour sampled by the impulsiveness items that define part of the *E* dimension." In fact, a recent factor analysis of the JEPI (Bennett, 1973) claims to have identified a factor which can be labelled 'inhibited-impulsive' thus making it possible to verify empirically Berger's suggestion. The present study, therefore, assessed the relationship between impulsivity as measured by the MFF and by the impulsivity (IMP) factor derived from the JEPI items identified by Bennett.

METHOD

Sample : The sample contained 98 boys aged 11–12 years, with verbal intelligence quotients in the range 80–125, all attending the same secondary school.

Procedure : Each child was seen individually for the administration of the two practice and 12 test items of the MFF. Some weeks later the JEPI was administered to the children in their classrooms.

RESULTS

The total sample's median response time (10·75 secs.) and median total error score (9·00) were calculated and these were used to form four groups of subjects ; a slow-accurate group, usually labelled reflective (N=33), a slow-inaccurate group (N=15), a fast-accurate group (N=15), and a fast-inaccurate group, usually labelled impulsive (N=31). Four pupils whose MFF error scores fell exactly at the median were omitted.

As it is unclear from the existing conceptual tempo literature whether impulsivity is best defined in terms of response time only, or response time and errors combined, both these criteria were used in the present study. Thus, all four groups above were employed in an analysis of the JEPI data which took the form of a 2 (slow/fast) by 2 (accurate/inaccurate) analysis of variance design. Table 1 presents the means of the four groups for these analyses which failed to yield any main effects or interactions which reached significance at the 0·05 level.

TABLE 1

MEAN E, N, L AND IMPULSIVITY SCORES FROM THE JEPI, FOR THE FOUR GROUPS DEFINED BY MFF PERFORMANCE.

Variable	Slow		Fast	
	Accurate	Inaccurate	Accurate	Inaccurate
Extraversion................	16·7	16·7	16·5	17·5
Neuroticism	12·7	12·2	14·7	13·4
Lie Scale	3·7	4·1	3·5	3·5
Impulsivity*	4·6	5·7	4·5	4·4

(* A low score indicates greater impulsivity).

DISCUSSION

The results from the present study and those obtained by Cairns (1973) appear to rule out the possibility that Eysenck's extraversion dimension shares any communality with impulsiveness as defined in Kagan's conceptual tempo dimension. Since it is generally agreed that impulsivity is not a unitary dimension (Eysenck, 1947 ; Barratt, 1965 ; Kunnapas, 1969) the most obvious explanation for these results must be that the two tests are tapping two different aspects of impulsivity.

However, it is interesting to speculate on a second explanation that children's self-report measures lack validity. This might account for the fact that Bjorklund and Butter (1973) found no relationship between the MFF response time or error scores and a self-report measure the Impulsivity Scale for Children (Sutton-Smith and Rosenberg, 1959). Further, it may also account for the failure of several investigators to obtain significant correlations between teacher ratings of impulsivity and extraversion as measured by the JEPI (Eysenck and Pickup, 1968; Eysenck and Cookson, 1969; Cookson, 1973). In contrast it has been shown that teachers rated slow-accurate MFF performers (reflectives) as significantly more attentive in class (Ault *et al.*, 1972), while another study found that teachers' ratings, on an item dealing with tendency to respond when answering questions in class, correlated positively with MFF response time (Bjorklund and Butter, 1973).

Kagan *et al.* (1966) have, in fact, suggested a reason why children's self-reports may be less than accurate. They found that when children were asked to evaluate their own performance on a battery of tests (which included the MFF) the time taken to decide about the quality of performance showed a significant (positive) correlation with MFF response time. They, therefore, suggested that as impulsive children take less time to decide about self-evaluation statements, it is possible that their self-descriptions will be less accurate, a result which they noted " has implications for investigators who use self-rating information in personality research." Therefore, in view of the present lack of evidence for the validity of the JEPI (Bennett and Youngman, 1973) further studies are now under way which compare children's self-reports with performance measures, under conditions designed to elicit more accurate self-reporting as suggested by Nias (1972).

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INTELLECTUAL AND MORAL DEVELOPMENT IN ADOLESCENCE

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SUMMARY. 65 girls between 12 and 15 years of age were presented with four of Kohlberg's 'moral dilemma' stories and Inhelder and Piaget's 'floating bodies' problem. The relation between level of moral judgment and formal operations was found to change from negative in Kohlberg's earlier stages to positive for the later stages of moral judgment. It was concluded that reasoning at the stage of formal operations is a precondition for progress to Kohlberg's Types 5 and 6 in moral judgment.

INTRODUCTION

Kohlberg (1958, 1963) has outlined a series of six stages in the development of moral judgment that he calls 'types.' According to Kuhn *et al.* (1975), the attainment of reasoning at Piaget's stage of formal operations is a precondition for progress to moral judgment at Kohlberg's Types 5 and 6 (judgments formed on the basis of moral principles). The ability to reason about rules of conduct, rather than just with them, and to consider moral principles from a hypothetical standpoint in the course of evaluating them, is based, they suggest, on the corresponding abilities in the realm of non-moral thought that develop with the coming of formal operations.

Confining ourselves to methods applicable to cross-sectional rather than longitudinal studies, there are two tactics from which we can choose in making a test of such a conception. One is typological. It evolves the simplifying assumption that the child is 'at' particular stages morally and intellectually. To test our hypothesis we then chart all the combinations of moral and intellectual stages we can find in a group of children. We predict that children are never found who have not yet attained the stage of formal operations but who have attained Types 5 or 6 in moral judgment. Kuhn *et al.* (1975) found this prediction generally borne out. They explain slight discrepancies as being due to the fallibility of their testing procedures.

A different tactic is the correlational approach. Instead of using a typological measure of stages we attempt to measure the strength of the relative tendency for a subject to think at any particular stage, in relation to strength at other stages, as indexed in tests by the percentage of his responses exhibiting attitudes or thinking appropriate to that stage. To compare intellectual and moral development we then compute the matrix of correlation coefficients between the two sets of scores. For this purpose scores must, of course, be expressed as percentages. We predict that, if stage 'x' in intellectual development corresponds to stage 'y' in moral development, the correlations between the strengths of stages below 'x' and those below 'y' will be negative. The correlations between the strengths of stages above and including 'x' and those above and including 'y' will be positive. This was tested by Lee (1971). He used Piaget's stages of moral development, rather than those of Kohlberg. He claimed that his results supported the prediction that concrete operations thinking corresponds to Piaget's (1932) Stage 2 in moral development ('reciprocity'), while formal operations thinking corresponds to Piaget's (1932) Stage 3 in moral development ('moral principles'). Despite his erroneous use of factor analysis it is clear from his raw correlations that they do in general support these correspondences, with this exception : strength at formal operations correlated positively, though only slightly (about ·15), with Piaget's Stage 2 of moral judgment, whereas it should have correlated negatively, given that Piaget's Stage 2 is below the level at which moral judgment is based on principles, being sometimes considered to correspond with Kohlberg's Type 2.

One possible reaction in the face of this discrepancy is to suggest that Lee's measure of moral judgment was inadequate because it was aimed at Piaget's stages of moral development, rather than at Kohlberg's types. Piaget's stages are probably not adequate to deal with the development of moral judgment in adolescence as they were based on work with children of 13 years and under. Our own study aimed to investigate the relation between a test of formal operations reasoning and strength at Kohlberg's various types of moral development, using correlational techniques.

METHOD

Sample.

Sixty-five girls from a single sex comprehensive school were from four age groups : 17 of 12 years of age ; 16 of 13 years of age ; 17 of 14 years of age and 15 of 15 years of age. Pupils over 14 years of age, who were also taking physics, were excluded as they might have encountered aspects of the Law of Floating Bodies as part of their syllabus.

Procedure.

The girls were first presented with four of the moral dilemma stories used by Kohlberg (1958) (stories 3, 4, 5 and 6) followed by his 12 questions about these stories, all in written form and presented as a group test. Then followed a test of formal operations reasoning ability : Inhelder and Piaget's (1958) Law of Floating Bodies problem. Each girl would first of all discover for herself whether each of a group of 15 objects floated or sank in a bath of water, noting the result against a written list of the objects. She then filled in a written form asking first of all why each body floated or sank and then " What makes some objects float and other objects sink ? "

RESULTS

Answers to the moral dilemma stories were scored using the definitions of Kohlberg (1971) of his types 1–6, cross-checked with the results of applying Graham's (unpublished) Guide to Coding Category Numbers, which lists in detail the assignment of responses to moral dilemma questions to Kohlberg's six types by first assigning each response to one of Kohlberg's 27 aspects of moral thinking. Where any conflict between these two criteria occurred reliance was placed on Kohlberg's (1971) definitions. The scoring was blind in relation to knowledge of the subject's score on the reasoning test. Answers to the Law of Floating Bodies questions were scored as 1 (formal operations at stage IIIA) if a unified explanation of the phenomena of floating bodies was presented, or 0 (concrete operations) if it was not. According to Kuhn *et al.* (1975) the change from concrete operations thinking to formal operations at Stage IIIA is a precondition for moral thinking at Kohlberg's Types 5 or 6.

The biserial correlations between the percentage of a subject's responses assigned to a particular moral judgment type and scores on the Law of Floating Bodies problem are shown in Table 1.

TABLE 1

CORRELATIONS BETWEEN STRENGTH AT A MORAL JUDGMENT TYPE AND THINKING AT FORMAL OPERATIONS STAGE IIIA.

MORAL JUDGMENT TYPE.

1	2	3	4	5	6
−·35*	−·63†	−·09	−·17	·73†	·36*

*=P<·05 †=P<·01

NOTE : Subjects of 14 and 15 years were omitted from these calculations for Types 1 and 2, as they had no score at these Types. Subjects of 12 and 13 years were omitted from calculations for Type 6, as they had no score at this Type.

DISCUSSION

It can be seen from Table 1 that all the correlations between strength at a moral type and level of thinking are in the predicted direction, four of them significantly so. It is particularly noteworthy that the negative correlation between Type 2 and formal operations thinking is one of the most significant. This prompts us to look further into the reasons why Lee (1971) found small positive correlations between Piaget's Stage 2 moral attitude and formal operational thinking. As it turns out, these are not far to seek. We can gather from Lee's Figure 7 that the relative frequency of Stage 2 responses to his moral dilemma stories follows a peculiar course in its relation to age of subject. Such responses first reach a peak between the age of 6 and 10 years. From 11 to 14 years they decline. But between the ages of 15 and 17 years they return to their previous peak, relative to other responses. According to Piaget's view of moral development, such responses should decline continuously throughout adolescence. The fact that Lee's score for these responses follows an upward trend in this period not only goes to explain his finding of a positive correlation with formal operations reasoning but also bears out our earlier suggestion that Piaget's sequence of stages in moral development is not adequate to deal with the period of adolescence, being derived from study of younger children.

ACKNOWLEDGMENTS—We would like to thank Dr. Douglas Graham for allowing us to use his Guide to Coding Category Numbers for scoring the answers to our moral dilemma questions.

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THE CONTRAST EFFECT IN THE SELECTION INTERVIEW

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Summary. An experiment was conducted to investigate the influence of preceding interviewees' performance on the assessment of a third candidate's interview. Mock interviews of candidates applying for medical school were recorded on video-tape, and were rated by 60 subjects. A highly significant contrast effect was obtained, but it accounted for only 11 per cent of total decision variance. A candidate's own standard of performance is by far the most important factor determining his rating. The contrast effect is most influential in the assessment of candidates of intermediate performance, but it is suggested that one group of researchers may have over-estimated its importance.

INTRODUCTION

The ' contrast effect ' refers to the influence of previous stimuli on the evaluation of a dissimilar stimulus. The concept has been used in the discussion of visual perception (Helson, 1964), the estimation of weights (Sherif *et al.*, 1958), social judgments (Hovland *et al.*, 1957 ; Holmes and Berkowitz, 1961), and can be applied to the ' Mutt and Jeff ' technique of police interrogation described by Zimbardo and Ebbesen (1969), in which a tough, abrasive interrogator precedes a kindly one, who successfully extracts a confession from the suspect. Recently, a series of American experiments have attempted to assess the importance of the contrast effect in interviews for job selection (Rowe, 1967 ; Hakel *et al.*, 1970 ; Carlson, 1970 ; Wexley *et al.*, 1972 ; Landy and Bates, 1973). It is plausible to suppose that the contrast effect might have importance in the evaluation of interviewees for university, colleges of education or medical school.

Most of the studies by occupational psychologists required subjects to rate successive application forms in terms of candidates' suitability for a job. The forms contained qualifications of different standards, and were shown to the raters in varying combinations, such as HHH, HHL, LLH, LLL, where ' H ' and 'L' signify a high and low standard of qualifications, respectively. The rationale was that the first two forms would establish an ' anchor ' and the assessment of the third would reflect any contrast effect. The usual result was that a contrast effect was obtained, which was statistically significant but which accounted for a negligible proportion of total decision variance. The only exception was the study by Wexley *et al.* (1972) which used video-taped, mock interviews, and found that the contrast effect *was* important in the assessment of candidates of ' average ' interview performance. In a follow-up study, Wexley *et al.* (1973) showed that the contrast effect could not be eliminated by a simple warning, but only by training raters to take account of it.

Wexley *et al.* (1972) used high (H) and low (L) standard candidates who were either ' completely qualified ' or ' completely unqualified ' for the job. This was reflected in the ratings, in which the H and L candidates received nearly-maximum or nearly-minimum scores. The authors point out that this may have provided a ceiling and floor for the action of the contrast effect on the assessment of H and L candidates, respectively. Equally, it might have exaggerated the size of the contrast effect in their HHA and LLA conditions. Landy and Bates (1973), in an experiment using application forms, did not obtain any significant difference between the mean ratings of the ' average ' candidate in these two conditions. The present experiment was an attempt to replicate the study by Wexley *et al.* (1972), within an educational context.

METHOD

Sixty subjects were asked to watch three video-taped interviews of young men, pretending to apply for entrance to the Middlesex Hospital Medical School. After seeing each interview and before watching the next, the subjects were asked to rate the candidate's performance on a 9-point scale. Each interview lasted five minutes. There were six experimental conditions and 10 subjects were randomly assigned to each condition—the same number as in the studies by Wexley *et al.* (1972, 1973). In each condition, the subjects saw a particular combination of interviews : GGG, GGA, GGB, BBG, BBA or BBB where G = ' good ' interviewee performance ; A = ' average '; B = ' bad '.

The subjects were Middlesex Hospital medical students. They were told that the experiment was to compare how people assess different types of interview. They were asked to assume that the candidates had equivalent qualifications, such as A-levels, and that a certain percentage of the top scorers on the interview would be selected for medical school entrance. Subjects were asked to make individual judgments and not to discuss the interviews during the experiment. An ' evaluation guide ' suggested the qualities for which they should look : Schwab and Heneman (1969) found that inter-rater reliability is increased when such a technique is employed. The subjects watched the interviewee on a television screen, and could see his face, hands, arm and trunk. The interviewer could be heard asking his questions, but was not seen on the screen.

Four amateur actors played the interviewees. Three actors each recorded two interviews, one to represent a ' good ' level of performance and one a ' bad ' performance. The fourth actor recorded an interview of ' average ' performance. The experimenter acted as interviewer, and asked approximately the same questions in each interview. Before the recording, the experimenter showed each interviewee a written set of questions and written suggestions for good or bad answers. The ' good,' ' average,' and ' bad ' performances were distinguished by the relative frequencies of good and bad answers, and by the manner with which they were delivered. The ' good ' candidates were relatively fluent and articulate, whereas the ' bad ' candidates were hesitant, curt and fidgety. The ' average ' candidate was rather flat and indifferent. We hoped to produce interviews clearly distinguishable but with a narrower range of performance than Wexley's. That the levels of performance were clearly distinguishable was checked by pretest trials.

RESULTS AND DISCUSSION

Analysis was by two-way analysis of variance and calculation of eta^2. Scores within only four of the six cells approximated to a normal distribution, and variance within cells was less homogeneous than desirable. It is important to point this out (cf. Cochrane and Duffy, 1974), although Hays (1963) argued that some relaxation of these assumptions is permissible, and Wexley *et al* (1972) appear to have relaxed at least one of them.

Table 1 shows that the pattern of mean ratings for the third candidate conformed to our expectations : the ' good ' candidate was rated higher than the ' average ' who rated higher than the ' bad,' and there was a contrast effect which Table 2 identifies as highly significant. Moreover, the range of our mean ratings was 4·9 points against 7·8 in the Wexley *et al.* (1972) study, which suggests that we succeeded in narrowing the range of candidates' performances. (Both experiments used a nine-point scale).

TABLE 1

MEAN AND STANDARD DEVIATION FOR THE THIRD CANDIDATE IN EACH CONDITION.

Condition	Mean Rating	SD
GG | G	5·5	1·9
GG | A	3·5	1·2
GG | B	2·1	1·2
BB | G	7·0	0·8
BB | A	5·6	1·4
BB | B	2·8	1·7

TABLE 2

OVERALL ANALYSIS OF VARIANCE OF RATINGS FOR THE THIRD CANDIDATE IN ALL CONDITIONS.

Source of Variation	df	MS	F	P<	η^2 %
Level of third candidate	2	72·47	35·69	·001	49·9
Contrast effect	1	30·82	15·18	·001	10·6
Interaction	2	2·46	1·21	NS	1·7
Error	54	2·03			37·8
Total	59				100·0

TABLE 3

ANALYSIS OF VARIANCE OF RATINGS FOR THE THIRD CANDIDATE IN THE GGA AND BBA CONDITIONS ONLY.

Source of Variation	df	MS	F	P<	η^2 %
Contrast effect	1	22·05	12·89	·01	41·6
Error	18	1·71			58·4
Total	19				100·0

TABLE 4

ANALYSIS OF VARIANCE OF RATINGS FOR THE THIRD CANDIDATE IN THE GGG, GGB, BBG AND BBB CONDITIONS ONLY.*

Source of Variation	df	MS	F	P<	η^2 %
Level of third candidate	1	144·40	65·93	·001	60·9
Contrast effect	1	12·10	5·52	·05	5·1
Interaction	1	1·60	0·73	NS	0·7
Error	36	2·19			33·3
Total	39				100·0

* One-way analyses of variance, comparable with that in Table 3, were also calculated for the good (GGG/BBG) and bad (GGB/BBB) conditions taken separately. For the good conditions alone, the contrast effect accounted for 23 per cent of variance (P< ·05). For the bad conditions alone : 6 per cent of variance (NS).

Table 2 shows an error variance of 38 per cent. Carlson (1970) had 40 per cent error variance in an experiment using application forms (easier to control), but most studies in this series have had error variance of about 20 per cent. (The present author in an unpublished study using tape-recordings had 16 per cent.) One possible cause is the use of students as raters, but Hakel *et al.* (1970) and Landy and Bates (1973) used both students and professional interviewers as subjects and obtained similar error variance (and contrast effects) for each group. Another possibility is that narrowing the range of candidates' performances reduced inter-rater reliability, and hence enlarged error variance.

The results we obtained suggest the following conclusions :

(i) The level of the candidate's own performance remains by far the most important factor in determining his assessment, accounting for 50 per cent of total decision variance (Table 2). This was true despite our restriction of the range of our candidates' performances.

(ii) The contrast effect has greatest influence on the assessment of candidates of intermediate performance. This is evident from inspection of Tables 1, 3 and 4. However, the use by Wexley *et al.* (1972) of extremely good or extremely bad candidates in the first two interviews may have led them to exaggerate the importance of this effect. In the present experiment, the difference between the mean ratings of the third candidate in the GGA and BBA conditions is 2·1 points (overall range=4·9), against 5·6 in their experiment (overall range=7·8). Moreover, our interaction effect in the overall analysis accounted for less than 2 per cent of decision variance (not significant), whereas theirs accounted for 11 per cent ($P < \cdot 001$).

(iii) Tables 2 and 4 show contrast effects which are larger than those obtained in equivalent experiments using application forms. Tables 1, 2 and 3 contradict Landy and Bates's (1973) claim that the contrast effect is unimportant even in the ratings of ' average ' candidates (again, from an application form experiment). This confirms the importance of visual cues and other gestures in interview assessment (cf. Shapiro, 1966, and Washburn and Hakel, 1973) and it demonstrates the need to make experiments as realistic as possible.

Hakel *et al* (1970) concluded that the contrast effect is so unimportant that interviewers "might as well go on believing that they are immune." This overstates the case. The contrast effect *does* have importance in the assessment of intermediate candidates' performance. However, its influence is probably smaller than many candidates, and possibly some interviewers, would like to believe.

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CRITICAL NOTICE

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WEIGHING THE EVIDENCE : A REVIEW OF 'PRIMARY FRENCH IN THE BALANCE'

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C. BURSTALL *et al.* (1974). *Primary French in the Balance.* Slough : NFER, pp. 304, £3·75.

Primary French in the Balance reports a 10-year evaluation study of the experimental introduction of French into the primary school curriculum. It was set up " to provide proper evidence on which to base a decision for the future," the decision being whether a general advance should be made towards introducing French into all primary schools. This is a laudable objective since too often innovatory curricula are implemented with little or no knowledge of their impact on the nation's progeny. Experiments of this type are, however, extraordinarily difficult to carry out, and it is, therefore, important to assess whether the design and analysis produced evidence strong enough to provide a basis for decision-making.

Originally the evaluation was to have been based on two cohorts. Details of the sampling procedure are not given, but the first cohort consisted of 5,700 pupils entering their second junior year in September, 1964, and the second cohort, 5,300 pupils entering their second junior year in September, 1965. Unfortunately, disaster soon befell cohort one because of unforeseen organisational problems. In some of the experimental schools French teachers were absent for long periods on intensive language courses, whilst in others no trained staff were available to teach the pupils. In addition some of the achievement tests were found to require modification. Thus, although this cohort was followed through until the second year of secondary school, few references are made to it. In order to counteract this inauspicious beginning a third cohort was drawn consisting of those pupils entering their second junior year in September, 1968.

The design took the form of a comparative quasi-experiment in which cohorts two and three were tested for achievement in French in the primary school, after two years in secondary school, and, in the case of cohort two, after five years in secondary school. Two types of control group were adopted. After two years in the secondary school the experimental group was compared firstly with a group of a similar age but who had started to study French on entry to secondary school, and secondly, with a group who were two years older than the experimental group but who had been studying French for an equivalent period. After five years in secondary school cohort two was compared with a group of similar age but who had started to study French on entry to secondary school.

The soundness of this type of design rests upon the comparability of experimental and control groups. In this study the groups were not equivalent. It was disturbing to find that the characteristics of these groups were often markedly discrepant even though the variables which should have been controlled were isolated early in the study. Three variables appear to be crucial : sex, type of school, and social class. In most analyses girls were found to attain significantly higher scores than boys. Pupils in grammar schools achieved significantly higher scores than those in comprehensives who in turn scored significantly higher than those in secondary modern schools. These relationships held irrespective of social class. Finally, a linear relationship was evident between social class and achievement. Yet none of these factors was controlled in the selection of control groups. The examples shown below illustrate this (Table 1).

TABLE 1

PERCENTAGE COMPOSITION OF COHORT AND CONTROL GROUPS.

	Cohort 3	Control Group 2	Cohort 2	Control Group 4
Social Class 1	28·72	41·99	49·94	60·49
2	39·10	32·84	31·62	27·93
3	20·54	17·31	13·69	4·72
4	11·62	7·84	4·72	1·85
School type (%)				
Grammar	22	28	47	61
Comprehensive	25	39	29	25
Secondary Modern	53	33	24	14

Control groups two and four were supposedly selected from the same schools as those attended by the cohorts, but the social class and school type compositions are very different. Other control groups were discrepant such as to favour the experimental group. Control group one was drawn entirely from comprehensive schools and contained fewer middle- and more working-class children.

The reader does not gain this kind of comparative information easily. He is continually referred to earlier papers, and, to compare the characteristics of experimental and control groups firstly requires the separate purchase of two bulky and expensive statistical appendices, followed by diligent search, since the comparisons are not presented in tabular form. Nevertheless, the search is necessary, for none of the discrepancies is statistically controlled. The same is true of sample loss data. Cohort 2 consisted of 4,694 pupils after transfer but dropped to 1,227 by the end of the secondary stage. Similarly, there was a sample loss of 37 per cent in cohort 3 at the stage of transfer from primary to secondary school.

Accepting the problems of experimental mortality and lack of control, what did the results indicate ? After two years in secondary school the experimental groups were generally superior to groups who had started to study French at the age of 11, despite sampling discrepancies favouring the control groups. After five years the differences are less clear cut and depend upon which control group is taken for comparison. These comparisons were based on cohort 2 and control groups 4 and 5. The sample differences between the experimental group and control group 4 are shown in the table but despite these the experimental group scored significantly higher on the listening test, although the control group performed better in reading and writing. However, when the experimental group is compared with control group 5, whose characteristics are more similar, the experimental group gained higher scores on all tests, half reaching significance.

These findings must be set against the nebulous nature of the independent variable and the differential provision apparent at transfer. The pupils in the experimental group were not following one, but many different French courses in the primary school. The only common element was an audio-visual approach which apparently many children did not like. Written scripts were not introduced until after one year, and sometimes not until after the second year. This meant that reading and writing was a common feature only in the final year of primary school.

Differences in provision also appeared at transfer. Although it was claimed that arrangements had been made to provide continuity of experience for the experimental group so that they would be able to continue learning French without interruption, this would not seem to have been the case. Only 13 per cent of the classes in the first year of secondary schools catered solely for these pupils, the remainder being placed into classes with pupils who were starting to learn French for the first time. Many secondary teachers raised objections to separate classes, and in other schools staffing problems were particularly acute. It also became clear that effective liaison between primary and secondary schools was lacking.

It seems a pity that after such a lengthy evaluation the opportunity was not taken to analyse differential performance at CSE and O-level. Instead an attempt at qualitative analysis was made of head teachers' views, although how representative those head teachers were is impossible to say since questionnaire response rates were not provided. From these responses it would seem that most secondary modern and some comprehensive head teachers felt that the experimental pupils had performed very well in CSE, but reports from grammar schools were equivocal. There was some indication that slightly more control pupils were taking O-levels although sampling error could be the explanation here. In answer to the question " I expect to be taking A-level " there was no difference in pupil response amongst the groups.

It is generally recognised that to make an innovation work teacher commitment is crucial. It is therefore of interest to establish teacher attitudes to the introduction of French at primary level. The vast majority of primary head teachers were reported to be in favour, as were a similar proportion of secondary head and class teachers after two years in secondary school. These positive attitudes had declined a little by the time the cohort three pupils were in secondary school, but even so three-quarters of heads and teaching staff were still in favour, being appreciative of primary school efforts and impressed by the early advantages given.

There was general agreement among secondary heads that, when compared with those who had started to learn French at the age of 11, pupils who had been taught consistently and well in the primary school were more fluent in spoken French, and more confident in their use of language. Their ability to understand spoken French, and their reading comprehension also received favourable comment. It was generally agreed that experimental pupils had a greater knowledge of, and interest in, the French way of life. They did, however, comment that they had greater difficulty in grasping grammatical structures and were less accurate in written work—reflections on the methods of teaching at primary level.

The generally favourable attitudes displayed by teaching staff at primary and secondary level were echoed by HMIs who reported on their visits to the schools. They felt that on the whole pupils had benefited from an early introduction to French.

Burstall concludes the report with a profit and loss account based on five questions:

(1) Do other aspects of education and general intellectual development gain or suffer from the introduction of French into primary school ?

The evidence did not suggest any influence—thus no profit and no loss.

(2) Are there any levels of ability which the teaching of French is of dubious value ?

This is a dubious question itself since analyses by ability level were not carried out in the study. Nevertheless, it is claimed that some children developed a sense of failure, a fact that is considered a ' loss.' But cannot this be said of any subject in the primary curriculum ? Do not some pupils feel that they have failed in learning maths on entry to secondary school ? Would it be legitimate to argue on the basis of such evidence that maths be discontinued from being taught at primary level ?

(3) Is there substantial gain in mastery achieved by beginning to learn French at the age of 8 ?

Burstall felt able to answer this unequivocally in the negative despite evidence to the contrary. The answer to the question rests on how one defines ' substantial ' and ' mastery,' and at what stage the evaluation is made. If substantial is equated with statistical significance for the sake of this argument, and mastery is equated with performance on specially developed French tests of unknown content validity, then after two years in secondary school the answer is unequivocally positive. Even after five years the experimental pupils performed better than one control group on all tests. Add to this superior performance at CSE, and no difference in aspiration for A-levels, would seem to indicate an answer somewhat different from that indicated by Burstall.

(4) What methods, attitudes and incentives are most effective in promoting the learning of French ?

This is another question that cannot be adequately answered by the data reported. No comparison of methods was made, although pupil attitudes to an audio-visual approach apparently differed. The high achievers liked it less than the low achievers. It was claimed that 'undoubtedly' the most powerful incentive to learn French is the prospect of being able to establish contact with the French-speaking people. This conclusion is based on an analysis of attitude items, but it is probably not too sceptical to hypothesise that the most powerful incentive is the fact that it is on the timetable and they are required to study it.

(5) What organisational and teaching problems are posed by the introduction of French into primary schools ?

The main disadvantages appear to be a reduction in flexibility in the primary school curriculum, although this argument seems to be based on the erroneous assumption that all primary schools are progressively oriented, and mixed intakes at secondary level. It became increasingly difficult to provide separate classes for experimental pupils even when it was thought desirable. However, it would be naive to blame this on the introduction of French. This situation developed because of the implementation of the experiment on a small scale. If French were introduced on a larger scale this problem would progressively decline.

The report concludes that " it is hard to resist the conclusion that the weight of the evidence has combined with the balance of opinion to tip the scales against a possible extension of the teaching of French in the primary schools." My interpretation of the results is that both the weight of the evidence and the balance of opinion favours the experimental group. What, I wonder, tipped the scales the other way ?

BOOK REVIEWS

BARKER, P. (Ed.) (1974). *The Residential Psychiatric Treatment of Children.* London ; Crosby Lockwood Staples, pp. xiii+354, £7·50.

The editor of this handsomely produced, but surely rather costly, volume has written five of the 12 chapters himself. The best known of the contributors, who hail mainly from Birmingham, London and Newcastle, are perhaps Professor Pond (who expectedly discusses the handling of brain-damage and epilepsy), and Drs. Hersov, Pinkerton and Stroh (school refusal, psychomatic disorders and psychosis respectively). The other topics dealt with, in addition to historical stage-setting and general discussion of aims and methods, are 'conduct disorders,' language defects, nurse-training, and assessing the results of treatment. There is a useful list of NHS units which provide the kind of care under review.

The diverse reasons, both causal and purposive, for having disturbed children 'in' are covered realistically ; and the widely-accepted view that short-term admission, even up to three months, may be necessary largely for thorough assessment and diagnosis (p. 13) should be contrasted with the *penchant* for instant 'diagnosis,' of a sort, evident in another recent book (Button 1974; see pp. 344-345 of this *Journal*). The range of treatments available, from finely controlled chemotherapies to highly unspecific *milieu*-therapy (including even merely removing a child from an intolerably stressful situation), are representatively expounded. But perhaps too little is made of the fact that in practice many units have to cater to very mixed ages and diagnoses, where what is sauce for the goose may well not be sauce for the gander. This problem is especially acute when some children are being treated, if only informally, by modification techniques which depend upon selective reinforcement from a controlled environment.

Which brings me to the regret that not one of these chapters has been entrusted entirely to a psychologist. Since it is the psychologist who provides, in many cases, the *only* systematic analysis of a child's cognitive functioning, emotional needs, conflicts and capacities which is ever made, and since it is he who nowadays is armed with some of the most powerful modificatory tools, this omission is not only unfortunate, but misleading (though a more accurate impression is given briefly by Rees in chapter 7). Indeed the oversensitive psychological ear may even detect a truculent tone in Pond's remark (p.241) that evaluating "the importance of brain damage . . . depends more on clinical psychiatric skill than on any sophisticated neurological or psychological tests." The nature and acquisition of this " clinical . . . skill " remains, of course, as unspecified as the primaeval medical mystique itself ; and the shadow of the doubtfully appropriate 'medical model' for description and taxonomy hangs conservatively over many of these elegant pages.

NEIL M. CHESHIRE.

BENNETT, W. A. (1975). *Applied Linguistics and Language Learning.* London : Hutchinson Educational, pp. ix+352, £5·75.

The author here attempts an argument for basing language teaching practices on a model of performance derived from theories of linguistics and psychology. In his preface he speaks of focusing on the complexity and variety of the needs of the learner ; but the latter remains an elusive fellow, lost between methods of instruction and theories of linguistics and learning. As a result the book, which is potentially interesting to a wide audience of teachers, linguists and psychologists, runs the risk of falling between three stools. Unfortunately the style does little to help, for the book is not easy to read, and careful editing throughout would have significantly improved its clarity and reduced its length.

Serious questions are nevertheless asked, and, after an introduction that sets the dialogue between mentalist and associationist approaches to learning in a historical perspective, the book can really be seen in two parts. In the first the author relates developments in the direct method in teaching to early structural linguistics and S-R learning. He points to the reliance on the learning of small phonetic and syntactic units in short steps, on habit building, and on the use of sentence frames as learning contexts, all to the relative neglect of the systematic understanding of language and of its social and cultural implications. The best practices of this approach are discussed, especially in relation to well-judged use of materials and equipment, including language laboratories, and their integration is recommended before the author turns to the question of what it means to acquire knowledge of a language. Discussions of the knowledge of the instructor, of that of the child learning his native tongue, and of the variations in tongues to be learned, make some useful points, but assumptions about the nature of learning are made that become more explicit in the second part of the book.

Here an attempt is made to draw on recent developments in linguistic theory. Aspects of generative and interpretive semantics are outlined, but much of the discussion is likely to deter language teachers, and there is not sufficient indication that linguists find them debatable. For the psychologist two major criticisms spring to mind. One is that, in spite of his apparent awareness that theories of language may describe what is learned rather than how it is learned, the author fails to make clear how he incorporates the various aspects of such theories into his performance model. The second is that the model amounts only to a suggestion that features of the linguistic rules of ' sentence generation ' be combined with some allowance for the data-processing and memory limitations of the learner. There is no attempt to consider more recent ideas about learning, and what is most obviously missing is consideration of the learning strategies and thinking the learner might bring to bear on the language data he encounters. This partly due to a failure to come to grips with what ' deep structure ' might mean, and it results in a blurring of distinctions between first and second language learning, wherein different strategies and forms of knowledge may well be employed. It also results in an approach to the interpretation of literature, and especially of poetry, in which the author seems unaware that he is likely to provoke considerable argument. In the general discussion of language teaching it leads, even when due allowance is made for the limited amount of information and experience available to the average second language learner, to overmuch emphasis on the teacher's control of learning rather than on his guidance of the learner's active engagement in seeking skill or knowledge. Consequently motivation and intention to learn are not treated with the attention they deserve.

Three aspects of this book must surely be appreciated, however, in spite of the problems of attempting an applied linguistics. Firstly, the discussion of the use of materials and equipment and that of the treatment of learners' errors both seem balanced and well-judged. Secondly, the attempts to integrate the best of approaches to instruction, rather than to advocate over-simplified lines, will surely appeal to the teacher who is sensitive to the structure and use of both the first and second languages of the learner, whether he appreciates the applied linguistics argument or not. Thirdly, advocacy of the supply of more experience of informed and well-prepared use of language than usually obtains for the learner, and of a community approach to the use of resources and shared experience in learning throughout life, is something we neglect to our disadvantage if we are to do our best for our pupils and for a country which cannot afford to stand in cultural isolation.

HAZEL FRANCIS.

BERGLING, K. (1974). *The Development of Hypothetico-Deductive Thinking in Children.* IEA Monograph Studies, No. 3. Stockholm : Almqvist and Wiksell International, pp. v+126, n.p.

This monograph is subtitled "A Cross-Cultural Study of the Validity of Piaget's Model of the Development of Logical Thinking." Publications in this area have greatly increased in the last few years with studies concerned with the passage from the pre-operational to the concrete operational stage predominating. Since only a few studies have dealt with cross-cultural variations in the development of formal operational thought the appearance of a monograph devoted to this topic should represent an important addition to the literature. Unfortunately the nature of the research does not match this expectation.

The core of the study involved the analysis of the results obtained by testing 918 Swedish boys, 880 Swedish girls and 1110 Hindi-speaking Indian boys on seven items which are regarded as tapping formal operational thought in Piaget's terms. The seven items were not designed for the purposes of the study but were selected from a science test included in the IEA Six Subject Survey. The Swedish and Indian data were not gathered for the purposes of the study but were obtained from the IEA Six Subject data bank. Adoption of this retrospective approach gives rise to considerable methodological difficulties.

Reinterpretation of the data hinged on the identification of items which could be regarded as Piagetian tasks and their conversion from multiple choice form with one right and four wrong alternatives to a shape in which the right-wrong dichotomy is ignored in favour of a classification of the distractors into three hypothetical stages of thinking. The feasibility of this approach is based on a single item which resembles Inhelder and Piaget's 'equilibrium in the balance' problem. On the basis of their choice of distractor on this item the children were classified into three groups representing stages of thinking. The scores of the three groups on tests of word knowledge, reading comprehension and school achievement in science were then examined and found to be significantly different. This finding was interpreted as a sufficient demonstration of the qualitative identity of the test item and the Piagetian problem and sufficient justification for the conversion of six other items which were subsequently regarded as Piagetian tasks.

This conclusion is open to question. As Bergling points out, Piaget describes a type of intelligence for which no suitable external criterion could be found in the IEA test battery. The two verbal intelligence tests, the word knowledge, and reading comprehension tests, were employed as external criteria on the grounds that they were the closest approximations available to a measure of this type of intelligence. They cannot, however, be regarded as sufficiently close approximations to bear the weight placed upon them in Bergling's argument. If these external criteria are discounted, the results of logical analysis of the implications underlying distractors are left as the only remaining support for the contention that the seven items tap the same aspects of logical thinking as Piagetian tasks. This evidence is, also, far from compelling since it has never been established that the logical structures of Piaget's theory are even a sufficient explanation of children's performance on his tasks.

Other aspects of the study are open to criticism. Scalogram analysis is employed without any consideration of the extent to which valid developmental conclusions can be derived from it. The seven items are divided into groups of three for the application of the analysis. Piaget's views are described at one point as a maturational theory and at another as a process theory of thinking ; they are neither. The initial review of studies of the validity of Piaget's theory is confined to the few in which scalogram or factor analysis has been employed.

In the concluding discussion an international survey of the development of logical thinking is proposed. Such an undertaking would provide an opportunity for a cross-cultural validation of Piaget's theory free from the problems posed by the adaptation of data.

J. G. WALLACE.

Button, L. (1974). *Developmental Group Work with Adolescents.* London : University of London Press, pp. xiv+208, p. £2·10, c. £3·95.

The ' developmental group work ' here has the praiseworthy aim of ' improving the quality of life ' of the group-members, or of assisting their ' personal growth and adjustment.' It is to be carried out in schools, youth clubs, local community groups, work-places and remedial institutions (indeed almost anywhere two or three people are gathered together . . .). It is envisaged as directed not merely at developmental defects, such as pathological shyness or anti-social destructiveness, but also at liberating unrealised potentials in the person whose behaviour is indeed within normal limits but ought to be outside them. Thus it offers, if not all things to all men, yet something to most ; and if the goals are broadly Rogerian, the tactics are less doctrinaire, for Button does not shun directivity.

Drawing on his own practical experience in this field, (and partly on unpublished papers by Swansea colleagues, which gives a parochial impression now and again), Dr. Button writes usefully subdivided chapters about general aims, ways of making contact with clients, their emotional-social needs, the value of identifying problems quickly (somewhat pretentiously called ' social diagnosis '), group techniques and, separately, about particular issues raised by work in youth organisations and in secondary schools. The language is mainly non-technical, with little reference to the complex questions involved in assessing problems of emotional development and personality, except at the ' why-not-ask-them?' level, and in evaluating would-be psychotherapeutic practices.

On the one hand, he acknowledges that the necessary skills for such work include understanding " the dynamics of groups, the psychology of personality, and the meaning of activity in terms of individual experience " (p. 3), which suggests rather high-level training and expertise. On the other hand, he seems to encourage all sorts of people, many of whom will lack such sophistication, to pitch in without too many theoretical scruples (ch. 3) ; and he urges that refinement in ' diagnosis ' (which sometimes means no more than accepting a teacher's view of a youngster or a group) should give place to speed of action lest the potential client be lost. Now, there is no doubt that much important work can be done by natural perceptiveness, intuition and good sense, but in the volatile field of adolescent disturbance it may be prudent, if not angelic, to fear to tread without proper equipment. Those of us who regret the proliferation of dubiously qualified ' social ' and ' case ' workers of various ilks will find such counsel rash.

It would not be fair, I think, given the down-to-earth purpose of the book, to call this mode of presentation superficial, but some readers will be misled as to which parts are original and representative. Thus Dr. Button expounds what amount to standard Eriksonian ideas about ontological security, autonomy and identity-diffusion without mentioning Erikson himself ; and it is surely perverse to refer the novice in group-dynamics to the esoteric and controversial Bion rather than, say, to sections from the more balanced Cartwright and Zander.

Button's attitude to the various theoretical frameworks that have been canvassed for group work is eclectic, bordering on the ingenuous. Some of these background assumptions may be positively obstructive, he argues, so he and his associates have " seized upon anything which seems to be helpful " (p. 77). Among the things seized upon are questionnaire-inquiries, street-corner conversations, psychodrama, role-playing, sensitivity-training and sociograms. But he does not indicate as clearly as is necessary that it is a rather subtle and complicated business to judge, in these matters, whether a procedure which " seems to be helpful " really *is* helpful, and to assess how a client apperceives it. Consequently, there is again the danger that well-meaning but ill-informed people may be encouraged to dabble in activities which they do not properly understand. We have all met the student to whom what is in fact bad English " sounds all right."

However, the exposition of particular rules-of-thumb, attitudes and ploys which a groupleader may usefully adopt, to foster communication or confidence in his clients, is commonsensical, unexceptionable and generally mainstream. And the author certainly scores several points in this reviewer's book by remarking (p. 156) that the so-called " Socratic method " of discussion has much in common with our ' modern ' programmed learning techniques (my favourite example has for some time been Plato's *Meno*, sections 82-85).

NEIL M. CHESHIRE.

CLARKE, A. M., and CLARKE, A. D. B. (Eds.) (1974). *Mental Deficiency : The Changing Outlook.* London : Methuen, pp. xx+886, £16·50.

This is a substantially revised and expanded third edition ; previous editions were in 1958 and 1964. There are a number of new contributors but it retains its original title of *Mental Deficiency* because the editors were persuaded, they say, to retain it on the grounds of familiarity. This seems a pity. This is probably the most important and comprehensive British text in this area so one has to recommend one's students to read it (buying is out of the question at this price!). At the same time one is persuading these same students not to use, for good reasons, out-of-date terminology like ' mental deficiency '; ' mentally handicapped,' ' retarded ' or ' subnormal ' would all have been more acceptable. But one recognises the editors' dilemma.

The 25 chapters, written by 18 contributors, singly or jointly, are grouped into five sections, ' Biosocial Factors.' ' The Experimental Analysis of Subnormal Behaviour,' ' Assessment,' ' Amelioration of Mental Subnormality,' and ' Services for the Mentally Subnormal and their Parents.' Placement of chapters in this scheme is inevitably a bit arbitrary and, for example, Mittler's excellent chapter on ' Language and Communication ' listed under ' Amelioration of Mental Subnormality ' has a lot to say about language development and its assessment. Presumably the increased size—partly the reason for increased cost—of this edition, must have concerned the editors. Perhaps there could have been some reduction by omitting more *general* material. For example, much of the material in Clarke and Clarke's chapter ' The Changing Concept of Intelligence—a Selective Review ' will be known to many readers or has been put together elsewhere. Occasionally, too, there is some overlap in coverage, e.g. both the Mittler chapter and Clarke's ' Psychological Assessment in Mental Subnormality ' describe the ITPA in some detail.

The editors, in their preface to the third edition, state that : " Although this book has altered almost beyond recognition, its general message remains the same ; that careful empirical work in all disciplines pays off both in the short and long term." Presumably, therefore, one can expect the very many reviews of empirical work to be carefully critical? Certainly Clarke and Clarke set a good example themselves in their chapter on ' Genetic-Environmental Interactions in Cognitive Development ' where, for instance, they look very carefully at Burt's widely quoted 1966 study of identical twins reared apart, pointing out many puzzling features of that research. On the other hand, in their chapter on ' Experimental Studies ' they seem to accept the important findings of Lenneberg *et al.* (1964) regarding the development of language in mongoloids (as does Mittler in his chapter) when, in fact, the research on which these findings are based is so defective in design and execution that no faith should be put in its conclusions. Clearly, detailed criticisms of *all* research reviewed would make the book impossibly long but one presumes there is an obligation to report critically influential pieces of research which do not even meet minimal research standards.

More specific comments on individual chapters must be very idiosyncratic. I happen to be familiar with the field of language and speech so that I am the more likely to notice important gaps in the chapter on ' Disorders of Communication ' by Fawcus and Fawcus ; for example, in the areas of stuttering and voice disorders there are important omissions. The chapter on ' Behaviour Modification ' by Kiernan seems particularly clear and systematic and has been found useful by students new to the field. Carr's chapter on ' The Effect of the Severely Subnormal on their Families ' seems to cover important new ground. Again from a tutor's point of view, chapters which, like ' Adoption and Fostering of Children of the Mentally Subnormal '(Clarke and Clarke), attempt a summary of the numerous research studies reviewed, are very helpful.

DAVID EVANS.

CONNOLLY, K., and BRUNER, J. (Eds.) (1974). *The Growth of Competence.* London : Academic Press, pp. xii+327, £6·80.

Competence is a desired state usually characterising a mature stage of the organism's functional, social, and intellectual development. Consequently, studying the path by which organisms attain competence is not unworthy, and it is the implicit intention of the present collection of papers to explore the process(es) by which a wide range of competencies are acquired.

If there is a recurrent theme in this collection it is that the development of intellectual (e.g., Richards and Carey) as well as social (e.g., Bronson and Hess) competencies can be deduced from a functional model (e.g., Connolly and Bruner) of the development of skill. The acquisition of manual skills, a subject of primary interest for both editors, is seen to symbolise in predisposition, in process, and in accomplishment more complex intra- and inter-individual competencies. In their view, rudimentary elements of a skill (presumably biologically given) can develop with use and/or instruction into facile modular ' subroutines ' which are later incorporated hierarchically into major behaviour ' routines .' Taken metaphorically, sounds become words and words become sentence thoughts which structure communication ; movements become gestures and gestures become expressive interactions which structure relationships. In this manner children's play, language, and tool usage are viewed from a biologically adaptive perspective of action and cultivation and the growth of ideals.

That behaviour apparently becomes more complex with development is perhaps an unfair (but, I think, accurate) simplification of the developmental thesis presented here. In some cases the analytic-synthetic approach tendered by such a part-into-whole developmental theory can be of value ; Carey's use of this heuristic to reanalyse data on the acquisition of conservation is exemplary. But this is truly too simple a view (one I suspect that the editors themselves would prefer to look upon as only heuristic), and, if Gestalt psychology has left us with few lessons, one of the most resilient has been that the whole is greater than the sum of its parts. Perhaps for these reasons, not all the contributors to this volume cared to or could address their subject matter to the model, and consequently the book is in no way a systematic examination of the hypothesis. Nevertheless this quasi-ballistic theory of development is provocative and subject to examination. What individual differences prevail at the beginning of life? What differences do they make? What effects have social, economic, and familial contexts? To which dimensions of growth does the model apply! What are its limitations?

Three facets of the book pall. First, unhappily and unfortunately, publication of these papers was delayed nearly three years after the occurrence of the conference at which they were delivered so that some of the research reported as still in progress (Richards) or without follow-up assessment (Bronson) lacks what is presumably now available. Second, it is sometimes difficult or at least straining to find the connection between certain papers (e.g., Tizard, McGrew, and Bowlby) and the theme of the book ; consequently, there is greater breadth than depth here. In this connection, the editors themselves note that a summary of the work is ' not possible.' Lastly, there is a touch of sadness to a social-policy context into which the book is cast for the editors see competence as a development toward more adequate ' coping ' with modern life. This is another fall from innocence for children: they no longer just play, they prepare.

M. H. BORNSTEIN.

CROSS, G. R. (1974). *The Psychology of Learning : An Introduction for Students of Education.* Oxford : Pergamon Press, pp. vii+294, p. £3·80, c. £6·00.

The author holds that before a student in training can get down to fruitful discussion of educational issues in seminars and tutorials he must have an adequate grounding in the disciplines that contribute to Education. This book is an attempt to provide this grounding in psychology. Its cover proclaims its purpose as " to relate classical and contemporary theories of learning to the art of teaching in school." If this really is its purpose, then it cannot be said its author has achieved it. This is partly because he has not kept his purpose and the people for whom he was writing clearly in mind and partly because of the range of topics he covers. By interpreting ' learning ' as ' behaviour modification ' he is able to include the acquisition of language, thinking and problem-solving, intelligence and ability, personality, educational technology and moral behaviour. These topics make up three-fifths of the book. The remaining two-fifths (the first part of the book) are made up as follows : two chapters on theories of learning and one each on memory, motivation and skills. Transfer of learning gets only four pages under Skills and a few odd references elsewhere ; programmed learning gets four pages under Educational Technology ; objectives are dealt with under Motivation, but there is nothing about how to evaluate the effectiveness of learning. Altogether, the book might be more appropriately described as an introductory text on educational psychology.

Though the author gives many helpful summaries of psychological researches and theories in the areas enumerated above (there are occasional infelicities of expresion) his general presentation is too academic and condensed to ensure that the book will engage the interest of the student in training and convince him that effective teaching demands a knowledge of psychology. From time to time he sets out the implications of a particular research or theory for education or for the understanding of human learning in the widest sense of the term. Sometimes he does this well, and sometimes he does it inadequately. In the opening chapters on theories of learning, for instance, he gives the key ideas of several stimulus response and cognitive theories, but he does not adequately illustrate how each theory contributes to our understanding of human learning in general and/or of the complex learning that goes on in the classroom. Missing altogether from the book is any attempt to show how different assumptions about human nature underlie different theories of learning or to help the student to look critically at the psychological assumptions that underlie his own teaching.

Finally it is disappointing to find in a book written for teachers in training errors of punctuation, grammatical errors and spelling errors (including on p. 248 " gentile " for " genteel ") that ought not to have escaped correction at the proof-reading stage.

A. LAING.

HAMEL, B. R. (1974). *Children from 5 to 7 : Some Aspects of the Number Concept.* Rotterdam University Press, pp. ix+91, DFl. 29·90.

In this brief monograph Dr. Hamel sets out to report some of his recent work on the role of identity in the transition from non-conservation to conservation of quantity and to consider the effect of training in conservation. In this context he argues the importance of Piaget's concept of ' structure d'ensemble ' and details his own studies which seek " evidence for the postulated interrelations in cognitive development."

The author makes no claim to furnish a comprehensive review of the field of preoperational thinking but rather concentrates his attention on some aspects of Piagetian number concepts and even within that constraint his attention to the literature is sparse. Dr. Hamel has, in the main, limited his style of writing to that affected by the serious journals so that the major portion of his book is presented as a series of journal papers (most of which, incidentally, are already available) with brief critical or continuity sections between. The book is thus economical, concise and to the point—and rather dreary.

The first four chapters of the book consider identity and equivalence concepts and compare Bruner's and Piaget's different viewpoints on the role of these in conservation acquisition. Dr. Hamel's data support Bruner's conception and further show verbal rule training in identity to be significantly more effective in promoting conservation acquisition than verbal rule training in equivalence. However, Dr. Hamel is concerned whether training experiments do justice to Piaget's theory of cognitive development ; whether in fact to concentrate on one logical operation means ignoring the interrelated unity of the whole period of operations.

The second part of his book is thus concerned with establishing evidence for the postulated interrelations in logical operations and Dr. Hamel focuses his attention on the 'structure d'ensemble' within the context of development in number concepts, specifically with reference to classification and seriation. He reports in detail studies using psychometric methods, correlational analyses and analysis of variance designs but is unfortunately forced to conclude that "therefore we think that our research investigating the psychological reality of the cognitive structures was doomed to failure from the start because of the research procedure and the material used" (p. 82). One is inclined to agree with Dr. Hamel on this point. Indeed one could easily get the impression that the author was testing a common element theory of transfer of training rather than a common process theory of intellectual functioning.

Furthermore, there is nothing new by way of theoretical comment or analysis in the book. However, to note the lack of review and analysis together with the dreary reporting of studies whose methods were doomed to fail because they were inappropriate to the problems investigated would be too hard on Dr. Hamel, for not only does he appear to be an honest craftsman but also a rather humble one in the face of our current guru, Piaget. Perhaps Dr. Hamel does not make enough of his 'failures.' One is reminded by Hamel's work of the suggestion made by Wason and Johnson Laird that the concept of horizontal decalage might well make aspects of Piaget's theory untestable.

CHARLES DESFORGES.

HERBERT, M. (1974). *Emotional Problems of Development in Children.* London and New York : Academic Press, pp. xi+362, £5·00.

As the author states in the preface to this book, in the past developmental and abnormal psychology have tended to develop along separate lines, with little cross-fertilisation between them. He has aimed, therefore, at achieving a tentative synthesis of these disciplines, professedly with the needs of the helping professions in mind.

After an introduction dealing with the question of the identification of children's emotional problems, which are appropriately given a wide definition, there follows a substantial section on the biological foundations of emotional difficulties. This is all of interest, but might well have been pruned, as some of the topics considered are not directly relevant to the theme of the book. For example, the discussion on 'brain-injured' children goes far beyond the emotional and behaviour problems associated with brain damage. The rest of the book considers emotional problems of children up to about 12 in terms of those relating to infancy, early childhood (toddler stage), the pre-school age and middle childhood.

Not surprisingly in view of the complexity of the task attempted, the work has a number of shortcomings, although Herbert has been at least partially successful in his attempt to demonstrate the links between developmental and clinical psychology. He is thoroughly at home in dealing with the literature in both of these fields, and the book is extremely well-documented, scholarly yet readable. The author maintains a balanced and open-minded approach throughout, and is aware of the many possible factors associated with emotional problems in childhood. Although occasionally lapsing into over-generalisations, and not always fully explaining the terms he employs, he is justifiably critical of the loose way in which labels such as ' minimal brain damage ' are used as explanatory concepts, and of the insufficient emphasis given to the part played by parent-child *interaction* in the genesis of emotional problems.

The organisation of the book on the basis of chronological age is not altogether successful. Not only does it lead to a good deal of repetition, but the author finds it impossible to keep strictly to specific age ranges and sometimes deviates considerably from his main theme. However, the book is to be criticised more for its omissions than for its content. Although the decision not to include adolescence was deliberately taken on the ground that there was more than enough to write about in a single volume without this period, the lack of a discussion of the problems of the teenage years and how they link up with earlier difficulties makes the book seem incomplete. An important topic such as defence mechanisms is dismissed with the words "see Anna Freud, 1937," and, while there is a chapter on psychosomatic problems, nothing is said about the relationship between physical handicap and emotional disturbance. Furthermore, relatively little attention is paid to the significance of school in the child's emotional development. Finally, as the book is intended for " those students and practitioners who have the responsibility of giving advice about problem children, or who are directly concerned with the care and treatment of such youngsters," it is a great pity that, apart from a brief discussion of behaviour therapy, the book contains so little about the work of the child guidance clinic and school psychological service in the assessment and treatment of children's emotional and social problems.

All in all, the book is likely to appeal more to students following predominantly theoretical courses than to those involved in work with children, but no reader will fail to derive some profit from reading this stimulating, thought-provoking and attractively-produced volume.

MAURICE CHAZAN.

LYTTON, H., and CRAFT, M. (Eds.) (1974). *Guidance and Counselling in British Schools.* London : E. Arnold, pp. 189, £2·25.

Ethical Standards in Counselling—Papers presented by a working party to the Standing Conference for the Advancement of Counselling. London : Bedford Square Press of the National Council of Social Service, 1974, pp. 69, 80p.

The counselling movement in education, still an infant if a vigorous one, is an expression of the persistent conviction among teachers that the well being and personal growth of children *is* their concern even though traditions which have emphasised a priority preoccupation with intellectual growth have prevented its finding an effective institutional expression. The move towards comprehensive education has helped significantly to establish a climate congenial to the introduction of innovative counselling roles and related developments : pastoral care infra-structures, liaison with outside helping services, closer links with parents, more ambitious conceptions of careers guidance, personal and social education programmes and specialised attention to vulnerable minorities such as immigrants, irregular attenders, those reluctantly contained in school and so on. There is a steady increase of in-service courses in pastoral care, guidance and counselling to bring new ideas and expertise to secondary schools. Since 1970 the movement has spread to the tertiary sector of education and there are signs of its spreading in appropriately modified forms to the primary schools.

Healthily, there is a rich variety of innovation in structures, roles and objectives from which there is much to be learned, particularly by educational psychologists to whom the teacher trained in counselling is an ally in what could usefully be a common collaborative mental health enterprise.

Guidance and Counselling in British Schools (more accurately, England and Wales) is a multi-authored collection of papers (four of them by educational psychologists) contributed by people who have been actively involved in the movement. This new and considerably up-dated edition will generously prolong its useful life for those who seek a convenient but comprehensive introduction to the topic. Those familiar with the first edition will find much additional material. A welcome, and a rare feature in counselling literature, is a good introduction to the sociology of counselling. Welcome, too, are the two or three discussions of careers work, though there is disappointingly little reference to the exciting developments, conceptual and practical, of the last decade—no reference to the work of the Careers Research and Advisory Centre, nor to the Schools Council working paper 40 (1972).

Ethical Standards in Counselling is a very slim book but impressively rich in content, a quart of rich ale in a medicine bottle. Eight people experienced in the caring professions have contributed thoughtful essays that are totally absorbing in the subtlety and surgical care with which basic issues are explored. Important concepts are delineated : *responsibility*, *accountability*, *contract*, *confidentiality*. So are derivative issues such as legal constraints upon ethical formulations, the collision of contracts and conflict of loyalties as between the rights of the client and of the employing body for instance, or between the counsellor's own moral and social responsibilities and his responsibility to his client, the misuse of confidence and the problems of extending a confidence to a third party. (It was recently reported that a senior cleric had invoked the principle of ' collective confidentiality ' to legitimate his disclosure to a variety of people the contents of a private conversation of an unambiguously pastoral kind). Despite its style of detached, dispassionate analysis, it is explosive stuff. Every sentence provokes both thought and attitude, and the book provides as an unintended bonus a succint statement of what counselling and psychotherapy are that will be readily understood by such paraprofessionals as psychologists. Whether one agrees with this or that point, one's grasp of the issues is enriched ; one's earlier simplistic formulations can never be entertained again. The book is a tribute to the conscientious professionalism of its authors and to the Standing Conference for the Advancement of Counselling which sponsored their collective efforts.

PETER P. DAWS.

MARKS, P. A., SEEMAN, W., and HALLER, D. L. (1975). *The Actuarial Use of the MMPI with Adolescents and Adults.* Baltimore : Williams and Wilkin, pp. xix+324, $14·75.

The problem of classification of mental illness has a long and not too successful history. Marks, Seeman and Haller in this work extend the approach they started in 1963. Their aim is to identify and describe typologies on the basis of the 10 clinical and four validity scales of the MMPI.

The method they use is to apply the Hathaway coding system to 1411 MMPI profiles from patients admitted to the University of Kansas Medical Centre. This categorises profiles by the order of scales two standard deviations or more above the mean for normals. This first approximation to types is adjusted both to ensure that the numbers of any type are above a specified minimum and for within-type homogeneity. Although it is clear on what evidence the correction for homogeneity is based, its exact specification is not explicitly stated. The methodology is thus intuitively sensible but arbitrary and lacks theoretical justification. It should be noted however, that such techniques as discriminant function and cluster analyses may make unwarranted assumptions or involve a number of arbitrary decisions. The authors make much of the fact that their typologies are based on empirical data rather than the clinical experience of a number of therapists which has been used in some other studies.

The description of the types thus identified was obtained by calculating their mean scores on each of the MMPI scales on admission, as they thought they would answer when discharged and when they actually were discharged. Also given for each type is the proportion diagnosed into four broad categories and their mean IQ as measured by a number of tests. Since not all tests were given to each patient the means were based on different samples. A verbal description of each type was obtained with the help of 13 psychiatrists and six psychologists. They rated the appropriateness of 108 statements to patients known to them and closely corresponding to the MMPI profile of a particular type.

The main extension to the 1963 work is in the application of similar techniques to a sample of 834 teenagers involved in psychotherapy. The coding system initially involved only the two highest MMPI scores and the subsequent adjustments to obtain the final typologies are explicit. In the case of the five adult types involving three scales at least two adolescent types out of a possible three are identified. Only one adult type involving two variables does not appear as an adolescent type, while 16 new types are identified.

The considerable agreement between the two samples must strengthen the validity of the overall typologies, although it weakens the case for providing separate adolescent norms. The book gives an easily usable summary of a vast amount of material and should be of interest to any user of the MMPI. However, although it may be possible to use it to provide automated personality descriptions, such descriptions should not be overemphasised at the expense of other available information.

RONALD R. MACDONALD.

MARGOLIN, E. (1974). *Sociocultural Elements in Early Childhood Education.* New York : Macmillan, and London : Collier-Macmillan, pp. xvi+400, £4·99.

This serious, painstaking and wide-ranging book begins with a statement of its ambitious aims. Written for prospective teachers of 3-8 year olds it assumes that such people are likely to be handicapped in their general teaching, and especially in their attempts to introduce the social subjects, by an inadequate theoretical knowledge of how social factors influence development. The author sets out to remedy this in two ways. First, she tries to provide a comprehensive account of the socialisation process, especially as it affects the formal educational system, so that prospective teachers may benefit in such ways as by having more insight into how their own social attitudes were formed and are currently expressed, by being more aware of how the school curriculum can be used and mis-used as a cultural influence, and by becoming more tolerant of the minority cultures they will meet as teachers. Secondly, the author tries to face up to the theoretical and practical problems involved in introducing social subjects to infants and tries to provide a practical guide on how to introduce such subjects in a responsible, interesting and theoretically respectable way.

The book has three parts. Part I includes such topics as the effects of living in a city or other region, the influence of changing beliefs about child rearing, and the possible conflicts between parents' and teachers' value systems. Part II deals with various aspects of the relationship between school curricula and actual social problems and Part III is largely concerned with a survey of the socialisation process in other societies, especially as related to their school systems.

Such admirable intentions force this reviewer to re-examine why he found the book so dreary, repetitive and disappointing. It is not because the author lacks industry or scholarship or takes up an extreme position—she frequently impales herself on the usual sociologists' fork of wishing to engage the reader's sympathy fully with underprivileged minorities without ever appearing to criticise the life style of the people concerned, but her observations are generally moderate and sensible. One begins to see what is wrong by considering how the author supplies evidence—typically this is by reference, not to empirical studies, but to a person or by a quotation. As a result some contextless references are virtually incomprehensible, as " even the biological functions of the human organism are primarily social " (p. 58), or simply banal as " Lee Rainwater, an American sociologist, considers German men good husbands " (p. 335). Such hard evidence as does appear often comes from psychologists like Bronfenbrenner or Havighurst—the level of some of the rest may be judged from the fact that in chapter 4 the writer bases some of her lengthy speculations on inter-cultural differences on her own questionnaire study, conducted in four European countries and involving a total of *twenty-five* families. This lack of discriminating ability coupled with enormous industry and an omnivorous filing system, leads to a book that is both too long and too condensed, jargon and cliché ridden almost beyond belief, and reaching its nadir in Part III. Here we are treated to an astoundingly naïve Cook's tour of world-wide socialisation processes, made memorable by such penetrating insights as " It is difficult for the Frenchman to be objective about himself " (p. 338), " Most men in Ireland try to avoid marriage " (p. 332), " The Englishman is shy and reserved " (p. 329), but rich also in such practical household hints as " In the Middle East the midwife fumigates the room by throwing the intestines of a porcupine on an incense burner " (p. 340).

Selective quotations are of course, unfair, and in a volume of such industrious length there are bound to be many good and useful sections. Finding them however may take more perseverance than many readers may possess, and the unvarying flatness of the author's prose style does nothing to encourage them. It is true that the pages are embellished by over 60 photographs of children doing such things as brushing their teeth, using a paintbrush, playing with dolls etc. These photographs will be of absorbing interest to any person who was unaware that children engaged in such activities, or of how they set about them, but to the more sophisticated reader they will offer a less valuable relief from the relentless unfolding of the text.

Despite all the patient energy and scholarship that has gone into this book this reviewer would not recommend it to British infant teachers, either for its practical advice or for its conceptual framework.

RALPH D. DUTCH.

RICHARDS, M. P. M. (Ed.) (1974). *The Integration of a Child into a Social World.* London: Cambridge University Press, pp. 316, p. £1·95, c. £5·00.

This is a book consisting of chapters covering a wide field, without a great deal of integration between the chapters. The first four chapters (with the possible exception of the introduction by Martin Richards) might be considered largely irrelevant though not without their own interest.

Chapter 5, by Richards, is concerned with " the first steps in becoming social." It emphasises the *predisposition* of the infant to become a socialised adult, though not neglecting other aspects. An important point made is that the attention of the infant is selective in relation to the world around it, and that it is apparently preadapted to certain kinds of stimulation. Richards rightly emphasises (as does Schaffer) the interaction sequences between parent and child, suggests that infants respond differently from birth to people and to things, and stresses that socialisation begins when *social meaning* is given to the infant's behaviour.

In chapter 6, Ainsworth *et al.* express the view that "infants are genetically biased towards interaction with other people from the beginning," and develop the implications of this theme. They very sensibly suggest that the ideal is a *balance* between 'attachment behaviour' (especially to the mother) and exploratory behaviour, and that, on the parental side, the most important factors are sensitivity, acceptance, co-operation and accessibility. As they say, "socialisation results from reciprocal mother-infant responsiveness." Independence is fostered by a secure and harmonious attachment, overdependence by insensitive mothering. This is a chapter which well repays careful study, and is probably the most stimulating chapter in the book.

In a very sensible and lucid chapter, the Tizards suggest that in the study of the effects of 'institutionalisation' it is essential to distinguish between 'good' and 'bad' institutions. Good nurseries, for example, they find to be unexceptionable and the children well advanced ; but this cannot be said of all.

In chapter 8, Bernal suggests that the crucial factors in the formation of child-parent attachment are the sensitivity of the mother and the amount and nature of interaction between mother and infant from birth. As he rightly points out, we do not yet know how the various aspects of the mother-child relationship are related to later aspects of social behaviour and relations with others. Bernal makes the point that we need studies of the *qualitative* differences in the patterns of relationships between parent and child, and a more detailed analysis of the parts played by *both parents and children* in the pattern of interaction.

The chapter by Bruner appears to be largely irrelevant, and looks like what used to be called a 'pot-boiler.' Ryan's chapter on early language development has interest in its own right, but scarcely adds to the main theme of the book.

Shotter, in chapter 11, affirms that children are 'made' rather than just developing, a point which will no doubt meet with very general approval. In Shotter's view, psychology is a *moral* rather than a *natural* science. Human behaviour must be regarded as the conducting of affairs in a rational and responsible manner, involving 'negotiations' between people. This seems very similar to the view of Harré and Secord, and the present reviewer has a great deal of sympathy for it. Harré, in chapter 12, stresses the importance of 'meaning' for the understanding of human behaviour.

In chapter 13, Blurton-Jones puts forward a very well-informed claim for the comparative study of man and animals, and of man in different societies. Blurton-Jones suggests that western society puts a heavy burden on the mother-child relationship, with an implication of adverse effects on both mother and child. There may be *both* constitutional and environmental factors involved in disturbances of individual balance.

In the final chapter Ingleby insists that child psychologists have not looked at their subject-matter in the light of the political system or power structure within which this subject-matter and its study exist. He suggests that the social function determining the spirit of 'scientific' enquiry is the maintenance of the political *status quo*. Ingleby objects to the assumption that one should adjust the individual to the system rather than the system to the individual. All one can really say about this is that a conflict of values is involved, which one must resolve on *moral* rather than *psychological* grounds—though the two may not be mutually exclusive. There is a strong feeling that Ingleby overstates his case in this chapter, and that in consequence the chapter loses in conviction. Nevertheless, the questions he raises are important questions which deserve consideration.

The long and the short of it is that *in toto* this is a very valuable book and can be confidently recommended to all those with a minimum of critical acumen.

D. GRAHAM.

ROWNTREE, D. (1975). *Educational Technology in Curriculum Development.* London : Harper and Row, pp. x+197, n.p.

Terms which were coined to clarify issues often, by over-exposure, end by clouding them. So it has been with 'educational technology.' When it is linked to another current catch-phrase in education, 'curriculum development,' there is a reasonable expectation of confusion. Rowntree, realising this, gets in his counter-punch early, in his first paragraph, and on the dust jacket :

> " For educational technology is as wide as education itself : it is concerned with the design and evaluation of curricula and learning experiences and with the problems of implementing and renovating them. . . . a way of thinking sceptically and systematically about learning and teaching."

He continues with a disclaimer that it is not just presentational hardware (machinery) and that this false concept has brought the area into disrepute.

Does the book substantiate this credo? It does consider in detail aims and objectives, differentiating the two, and looks at problem-solving, behaviour, models, learning, teacher strategy evaluation and implementation. To that extent it could be considered just another textbook on educational psychology for students but one which placed most emphasis on cognitive aspects. Rowntree would support this as he sees course planning and curriculum construction as the central process in education but nods in the direction of affect and conation.

The discussion on aims and objectives sees programmed learning as a main influence leading to the new technology, especially highlighting objectives. The emphasis is on efficiency, which is educationally logical rather than cheap financially. The usual pundits from Bloom onwards are cited and we have read over a third of the book by the time we are convinced (or not) that without clearly stated objectives it will be impossible for us to determine whether we have achieved them.

The analysis of the objectives leads to determining the strategies for learning and the media to be employed. Here Gagne's taxonomy receives favourable mention especially as regards chaining related to mathematics. The flow charts provided actually contribute to the argument rather than obscure it as so often happens, nor do they insist that there is one best way of learning. The network analysis reproduced here, and regularly elsewhere, does not appear to be very helpful in a classroom although it is claimed that teaching decisions can be based on it. It follows that decisions on presentation media and the whole system to be employed can be made but not once and for all. Feed-back precludes this and leads to a continuing overhaul of content and technique.

The section on evaluation of results of the learning experience is comprehensive to the extent that the nuances of assessment, measurement, quantification, quality control, evidence and conclusion are appreciated and pointed out. It would be uncharitable to say that the chapter is brief and superficial as it says all that can be said on a subject which is important expensive, much affected by prejudice and with little theoretical foundation. Finally, there is a comment on the practical problems of innovation and change and the whole is rounded off by a large reference list, mainly British and up-to-date to the extent of often quoting articles or conference papers.

Just as Shakespeare cannot be blamed for the fact that '*Hamlet*' is too full of quotations, so Rowntree cannot be blamed for the feeling of *déjà vu* produced by the book. He has been an active advocate of educational technology for some time in Britain and his views are well-known. They are also expressed with a clarity and felicity which makes the reading and assimilation enjoyable.

J. G. MORRIS.

SCHIEFELBUSCH, R. L., and LLOYD, L. L. (Eds.) (1974). *Language Perspectives—Acquisition, Retardation and Intervention.* London : Macmillan, pp. xv+670, £7·95.

It is a rare and welcome occasion when leading authorities in cognitive psychology, applied behaviour analysis, psycholinguistics, applied developmental linguistics, special education, speech pathology and audiology meet together to discuss language acquisition. The Chula Vista Conference in Wisconsin in June, 1973, was such an occasion, and its specific purpose was to formulate valid bases for teaching language to the mentally retarded and others with language disabilities. This book is the outcome, and the multi-disciplinary scope and communication of ideas over common interests which the conference sought to stimulate are well reflected in this collection of 17 conference papers and eight discussion summaries. The book is in the tradition of the early work of Jakobson and Lenneberg which, in exploring language disability, informed the study of normal language acquisition. But it reflects several new directions strongly influenced by the work on child language which has blossomed since the early sixties and which, in its turn, is now informing intervention principles and programmes.

The first half of the book devotes four sections to normal language acquisition and development processes—infant reception research, development of concepts underlying language, development of receptive language, and the developmental relationship between receptive and expressive language. The second half is devoted to three sections particularly concerned with retardation and intervention, with papers on non-speech communication systems, early language intervention, and language intervention programmes for the mentally retarded. Each section comprises two or three conference papers on a common theme—usually from different theoretical or practical perspectives—and a discussion summary which serves the dual purpose of reviewing the papers, their different emphases and common strands, and of summarising the main issues which arose in reaction to the papers during the conference. The discussion summaries are mostly excellent, revealing important areas of disagreement yet mainly illustrating the immense value of multi-disciplinary discussion and indicating clearly those areas which would benefit from corroborative research in the future.

Whilst all sections of the book will interest readers who share the disciplines of the conference participants, those readers who work with the mentally retarded and the language disabled may be disappointed by the—albeit overt—theoretical bias of the early sections. However, there is much here they will find valuable. Horton's programme for hearing-impaired children which, significantly, involves parental contribution, the paper by Miller and Yoder on underlying principles and strategies, the Ruder and Smith review of the central issues in language training, and Cromer's insightful review of the processes and diagnostic distinctions concerning the mentally retarded are all outstanding and informative. Also issues surrounding the use of manual language systems with the hearing-impaired and the non-vocal child are aired in a paper by Moores and in the discussion summary by Dever. In this area, the Premacks' proposals concerning plastic language systems as potential alternatives to manual systems will also be interesting.

Beside the multi-disciplinary perspectives—reflected most directly perhaps by the fact that none of the conference papers was tied to just one theory or operational strategy—there are two other major orientations which may well dominate the field in the seventies and which can be seen in a positive light. First, the strong emphasis upon receptive language and an important discussion of the nature of, and interaction between, comprehension and production. This emphasis marks a welcome shift from the myopic attention to only the productive aspect of the normal and disabled child's competence, and implies important alternatives to those programmes which assume imitation to be the sole initial training strategy. Second, the new dialogue between cognitive psychology and developmental linguistics on the cognitive bases for language acquisition. (Here a number of papers owe much to Piaget and some of the intervention programmes give priority to conceptual development). The corollaries of this dialogue are for the theorists a welcome attention to semantics, and for the practitioners an affirmation of the crucial importance of context as an interactive springboard for both the child's conceptualisation and communicative behaviour. The theory that the child's conceptualisation of relations that exist in its environment are vital prerequisites for the realisation of those relations in language is proving to be attractive. However, we are yet to discover just what the prerequisites are at each stage in the acquisition process, and inferring this particular causal relationship may prove misleading. Cromer and Schlesinger offer interesting cautions on this issue in their papers.

Perhaps the book should have offered more in the area of diagnosis, particularly in audiology. Differentiation of types of retardation and disability and the implied different language problems and different processes such children might exploit in language acquisition certainly deserved more attention. Similarly, the justifiable focus on cognition-semantics relationships—a reaction perhaps against the syntax-dominated and descriptive work of the early sixties—might have been balanced by an equally justifiable consideration of the place of information processing in language acquisition (the influence memory, coding, transfer and retrieval strategies might have on how language is acquired). Indeed the book clearly indicates future priorities and one of the most salient is the need for adequate explanatory theories, and these based on discovering the child's strategies and systems rather than imposing theory or descriptive technique on the child. There is also need to discover acquisition universals and the so-called critical periods of reorganisation in the acquisition process in order to guide prediction and evaluation in future intervention. The need for an adequate learning theory remains, and Staats' provocative effort to marry behaviourism and cognitive theory in his epilogue is disappointing.

Overall the book adequately reflects the ' state of the art '. It is helpfully organised and certainly offers a wealth of research and reviews of research as catalysts for future development. All those concerned with language acquisition and development with normal and disabled children will find it a valuable source.

MICHAEL P. BREEN

STONE, L. J., SMITH, H. T., and MURPHY, L. B. (Eds.) (1974). *The Competent Infant : Research and Commentary.* London : Tavistock, pp. viii+1314, £11·00.

This huge collection of articles is enough to daunt even the most omnivorous reader—1,300 pages, 200 articles. Clearly it is the type of book which one refers to or dips into. As the title implies there is a topical urge to the enterprise. The editors have attempted to contrast the traditional view of the helpless infant with the competence which more recent research has uncovered.

The book is divided into several sections which are a mixture of the chronological and the thematic ; for example " The Capabilities of the Newborn " and " The Social Infant." I approached the book as a reader might, by looking thoroughly at one section : I chose visual perception, and then dipped into the remainder. Readers who are familiar with undergraduate child development texts will recognise the homey style of the editorial chapters : " Church's babies, like Piaget's, are cognizers ; like Bruner's they are integrators. It will be noted that they also exhibit an appropriate pawky humour and resistance to experimental manipulation." The overall selection of papers on visual perception is good. Most of the well-known names and themes are present : Fantz on visual preferences, Bower on the constancies, Salapatek on eye-movements. At the same time there is some dross. Several papers are devoted to the preference for complexity and moderate discrepancy from the familiar. Both of these dimensions have been defined according to adult-intuitions. Not surprisingly this has led to a maze of contradictory studies. The inclusion of these studies reflects an editorial belief that visual attention is under the control of cognitive structures which are formed before motor learning takes place. This belief seems perfectly reasonable to me. For example, it seems unlikely that a Cyclops would surprise a two-month infant. At the same time no adequate theory of the development of these schemata is available at present so that accurate predictions cannot be made as to what the infants regards as discrepant at any given age.

In line with this emphasis on cognition preceding action is a neglect of Piaget who has repeatedly argued that cognitive development requires action upon objects. One omission is particularly surprising, namely Piaget's observations on the development of object-permanence. This research definitely reminds us that the infant is much less competent than we might suppose from casual observation.

Browsing through the other sections, I found many excellent papers which might be difficult to trace in the original version—papers by Zing Yang Kuo, by Peter Wolff, by Gene Sackett and so forth. Despite its encyclopaedic quality the three years which have elapsed since its completion prevent the book from being an up-to-the-minute review. Instead it may best serve the off-duty reader who is prepared to encounter the unexpected.

PAUL HARRIS.

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